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ENGINEERING OPERATIONS REPORT

NERVA 400E THRUST TRAIN DYNAMIC ANALYSIS

PROJECT 110

14 APRIL 1972

D. F. VRONAY

(NASA-CR-132224) NERVA 400E THRUST TRAIN DYNAMIC ANALYSIS Engineering Operations Report (Aerojet-General Corp., Sacramento,

Calif.) 192 p HC \$11.75

APPROVED:

G3/22 17708

U. A. PINEDA, MANAGER

APPLIED MECHANICS

ENGINEERING STAFF DEPARTMENT

N73-24664

Unclas

CLASSIFICATION CATEGORY

CLASSIFYING OFFICER

SUMMARY

The natural frequencies and dynamic responses of the NERVA 400E engine thrust train were determined for Nuclear Space Operations (NSO), and Earth-Orbital Shuttle (EOS) during launch and boost conditions. For NSO, a "mini-tank" configuration was analyzed with the forward end of the upper truss assumed fixed at the stage/mini-tank interface. For EOS, both a mini-tank and an "engine only" configuration were analyzed for a specific Engine Assembly Support (EAS) stiffness. For all cases the effect of the shield on dynamic response characteristics was determined by performing parallel analyses with and without the shield. Gimbaling loads were not generated as that effort was scheduled after the termination date.

The analysis, while demonstrating the adequacy of the engine design, revealed serious deficiencies in the EAS. Responses at the unsupported ends of the engine are excessive. Responses at the nuclear subsystem interface appear acceptable. It is recommended that additional analysis and design effort be expended upon the EAS to ensure that all engine responses stay within reasonable bounds. In particular, the inclusion of damping in the EAS should be given careful consideration in all future designs. Supports at the ends of the engine appear necessary during launch.

NERVA 400E THRUST TRAIN DYNAMIC ANALYSIS

I. INTRODUCTION

The purpose of this analysis was to determine the natural frequencies and dynamic responses and loads of the NERVA 400E thrust train for Earth Orbital Shuttle (EOS) and Nuclear Space Operation (NSO). The following six "cases" were analyzed. For EOS, both a mini-tank and an "engine only" configuration were analyzed for a specific Engine Assembly Support (EAS) stiffness. For NSO, only the mini-tank configuration's response was investigated. For both EOS and NSO parallel analyses were performed with and without the shield to determine its effect on the thrust train loads. Table 1 and Figures 1, 2, and 3 show, conceptually, these six cases and their identification. Figure 4 shows the major engine interfaces and corresponding grid points and engine stations.

For each of the six cases the natural frequencies and mode shapes were determined. A subset of these normal modes were then used as the degrees of freedom to describe the engine characteristics for the dynamic response calculations. For EOS the system input consisted of the data of Reference 1. For NSO the input was the same as that for NSO in Reference 2. In each case a frequency response analysis was run and loads determined. Table 2 is a summary of the natural frequencies for all cases. Tables 3, 4, and 5 summarize interface displacement and acceleration responses, while Tables 6, 7, and 8 summarize the interface loads, for EOS engine only, EOS mini-tank, and NSO respectively. In Tables 6, 7, and 8 the key to the column headings is as follows:

BM-1: Bending Moment in the X-Y Plane

BM-2: " " X-Z "

S-1: Shear in the X-Y Plane

S-2: " " X-Z "

Axial: Axial Load

Torque: Torsional Bending Moment

The engine coordinate system is defined in Reference 3, and is shown in Figure 5. The actuator loads are summarized in Table 9.

Section II presents the details of the analysis for EOS and NSO.

Section III contains a list of references, including the drawings from which the engine was modeled, and the tables and figures referenced in this report.

Appendix A is a listing of the basic BULK DATA decks for each of the six cases of Table 1. Appendix B is a list of the multi-point constraint (MPC) equations used to model the mini-tank.

II. TECHNICAL DISCUSSION

The structural dynamic analysis of the NERVA 400E engine thrust train was accomplished using the NASTRAN computer program and the all new three dimensional model, as promised in Reference 2. The basic engine model consisted of 456 unconstrained degrees of freedom and was an assembly of metric and scalar finite elements. All structural mass was "lumped" at the grid points as translational inertia only. The inertia of any nonstructural mass items however was accurately accounted for by the inclusion of all significant terms of the item's mass matrix. Table 10 is a listing and identification of the degrees of freedom of the basic engine model.

The mini-tank, when required, was incorporated into the basic engine model using a modal synthesis technique per Reference 4. Since all cargo bay interface points were assumed to be in phase, and since the truss/mini-tank interface portion of the tank was reinforced, adequate representation of the mini-tank was achieved using the three translational rigid body modes plus the six lowest free-free elastic modes for the first (m = 1) harmonic. The fiberglass truss members connecting the mini-tank to the stage and Upper Thrust Structure (UTS) were assumed to carry axial loads only. The mini-tank was assumed empty for all analyses. Figure 6 shows the geometry and nodal breakdown used to determine the mini-tank modes. Table 11 is a list of the generalized mass and stiffness values used for the mini-tank synthesis and the natural frequencies of its elastic modes. Appendix B is a listing of the multi-point constraint (MPC) equations used to model the mini-tank.

The Engine Assembly Support system (EAS) was modeled as a combination of scalar springs so chosen as to keep the EAS natural frequencies above the highest EOS input frequency. These "springs" were connected between the engine attach

points and the shuttle cargo bay floor (see Figure 4). Table 12 is a list of these spring stiffnesses. No damping was included in the EAS design and it is believed that this contributed appreciably to the very high responses shown for the "engine only" cases (Cases 1 & 2). It is recommended that all future engine analyses include the EAS as part of the engine design, and that some type of external damping be incorporated in the initial analyses.

The Nuclear Subsystem (NSS) was modeled as the scalar system shown on Figure 7. It was intended to replace this simplified NSS with a modal model for the final analyses, but termination of the program precluded achieving this goal even though the required data were available.

Sections A and B present the detailed results for EOS and NSO respectively. Section III contains a list of references. Listings of the basic BULK DATA deck for each of the three major configurations (EOS engine only, EOS mini-tank, NSO) appear in Appendix A.

A. PRESENTATION OF RESULTS FOR EOS

This section presents the results of the dynamic analysis of the NERVA 400E engine thrust train for EOS launch and boost. Two major configurations were analyzed: "engine only" (Cases 1 & 2) and engine with mini-tank (Cases 5 & 6). Odd numbered cases (1 & 5) refer to configurations with the shield and even numbered cases (2 & 6) to an engine without the shield. The same EAS was used for both analyses, although the mini-tank has the effect of an additional restraint on the engine as it was assumed fixed at the forward end of the cargo bay. However, all cargo bay interfaces were considered as "driven" points for purposes of analysis. At this point of the analysis no attention had been given to the need, if any, for a separate mini-tank support.

The loading was that of Reference 1. There were no engine natural frequencies below 20 Hz, so only the 10-35 Hz range was of interest. As no detailed spectral breakdown was available it was impossible to run a transient forcing function exhibiting the desired harmonic decay indicated in Reference 1. Instead, a frequency response analysis was run using the maximum loads, encountered at Cut-Off/Separation, i.e., 1.5g longitudinal (X) and 1.0g lateral (Y&Z), over

the 10 to 35 Hz range. The interpretation of the results of such an analysis is always open to speculation; i.e., just what do they mean, and how are they to be used to realistically evaluate the design. For example, Table 13 shows a typical acceleration response over the frequency range of interest. If the response at each frequency is merely summed, this assumes that the full power of the input is available at each and every frequency of the spectrum simultaneously and in phase. Such an assumption, while usually providing a conservative upper bound to the response, is hardly realistic. A more frequently used method of data reduction is a type of weighted average of the results whereby the response at each frequency is squared, then summed, and finally the square root taken of this sum. This root-sum-square method (RSS) has some usefulness if nothing is known of the system response characteristics, as it will, normally, yield conservative results. However, in the case of the NERVA 400E engine thrust train, as in most elastic structures, the response is typically of a "narrow band" type, i.e., most of the response occurs in a narrow band centered about each natural frequency of the system. The RSS method can then be applied to the responses in each of these bands to obtain the total response. Such an approach still assumes that the full power of the input is available at each natural frequency and that all normal modes of the system respond in phase, both conservative assumptions. However, lacking a more detailed spectral breakdown of the input excitation, it is believed to be the most realistic method of interpreting the results of this type of analysis for this particular structure. Therefore, all data presented for EOS are rms values assuming a narrow band response with the full input power being available and in phase at each natural frequency of the system. Table 13 shows the results of the three types of data reduction for the typical acceleration response shown.

Tables 14, 15, 16, and 17 list and identify all natural frequencies up to twice the highest input frequency for Cases 1, 2, 5, and 6 respectively. Figures 8, 9, 10, and 11 show the corresponding normal mode shapes. Tables 3, 4, 6, and 7 are summary tables of the rms displacement and acceleration responses and thrust train loads for these same cases. It is important to note that while removal of the shield predictably raises the engine natural frequencies, its effect on the responses and loads is not uniform throughout the thrust train.

B. PRESENTATION OF RESULTS FOR NSO

This section presents the results of the dynamic analysis of the NERVA 400E engine thrust train for NSO. The mini-tank configuration was analyzed both with and without the shield as Cases 7 and 8 respectively. The upper truss was assumed fixed at the stage for the analysis, the truss/mini-tank/truss/engine assemblage forming essentially a cantilevered beam. The input consisted of the random accelerations characterized by the Power Spectral Density curves shown in Figures 12 and 13 for the TPA and Nozzle, respectively. All loads were applied simultaneously along each of the three coordinate axes over the 0-100 Hz range. All responses are 30 values.

Tables 18 and 19 list and identify the engine natural frequencies below 100 Hz for NSO, and Figures 14 and 15 are the fourteen lowest mode shapes for Cases 7 and 8 respectively. Tables 5 and 8 are the displacements and accelerations, and interface loads, for these same cases.

III. REFERENCES

- 1. Memo, NASA S&E-ASTM-AA(71-46), "Acceleration Loads for Earth Orbital Shuttle (EOS) Launch", July 30, 1971
- 2. ANSC Memo N8120:053, To W. E. Stephens from U. A. Pineda, Subject: "Transmittal of Report N8120R:71-003, 'Launch and Nuclear Space Operation Vibration', Project 110", dated 7 July 1971
- 3. ANSC Memo N8610:011M, To K. Sato from A. D. Cornell, Subject: "Engine Coordinate System", dated 2 June 1971
 - 4. NASA SP-221, "The NASTRAN Theoretical Manual", September 1970
 - 5. The following Aerojet drawings were used:

1137400E	Engine Layout
1138808 A	Pressure Vessel and Closure
1138000A	Nozzle
1137992C	Nozzle Extension
113 8420D	Gimbal Assembly

D. F. Vronay
14 April 1972

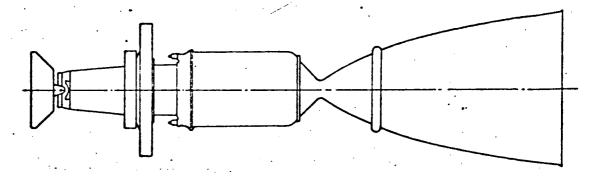
1137978B Gimbal Pivot

1137985 UTS

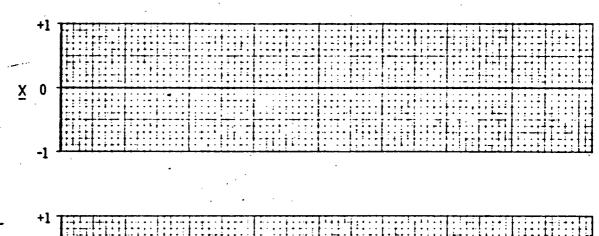
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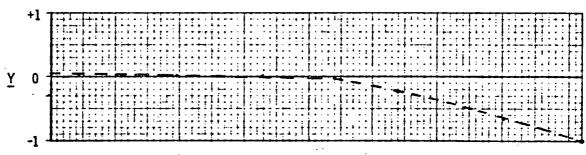
1138352C External Shield

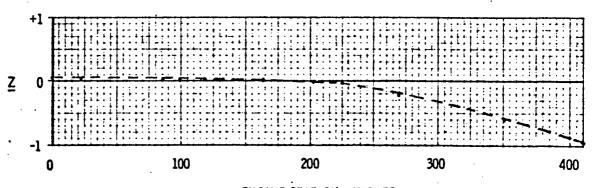
FIGURE 9-1



f = 24.062 Hz

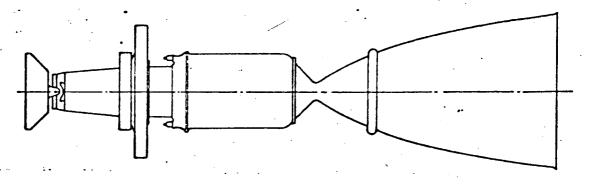




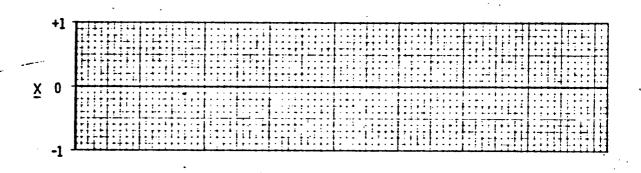


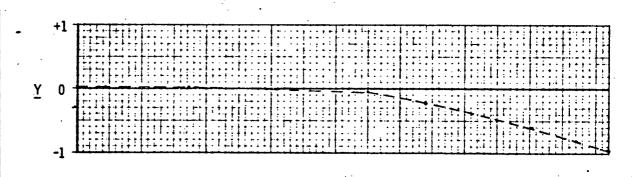
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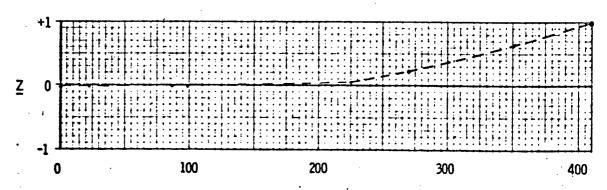
FIGURE 9-2



f = 24.121 Hz

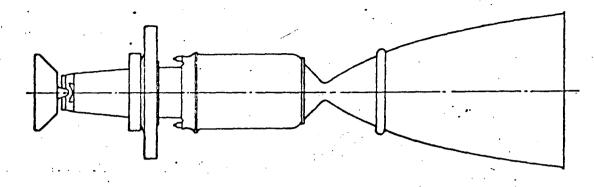




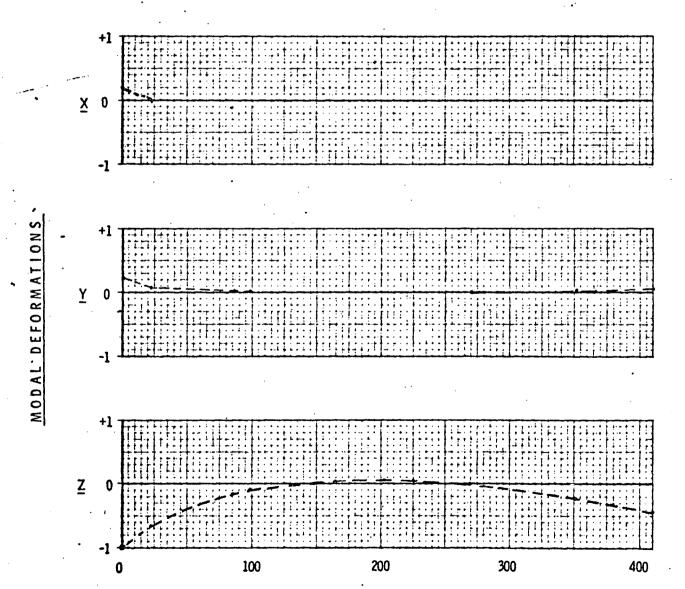


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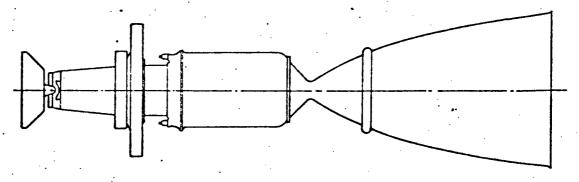
FIGURE 9-3



f = 35.409 Hz



ENGINE STATION - INCHES



f = 35.74 Hz

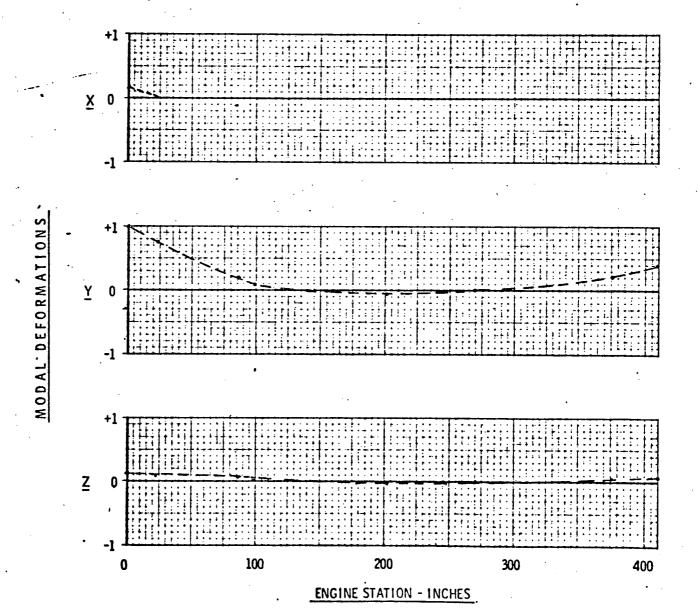
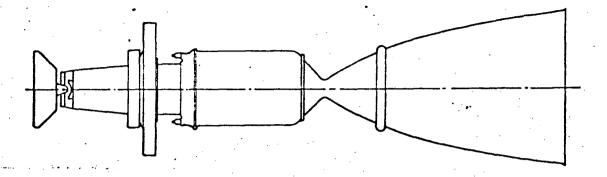
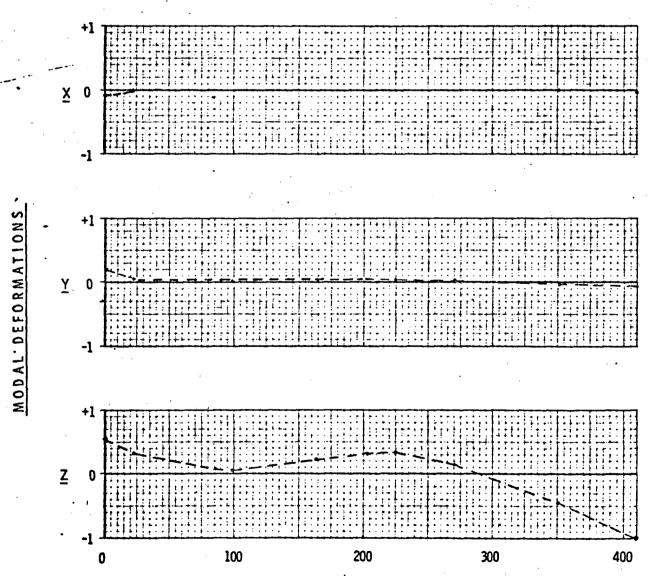


FIGURE 9-5

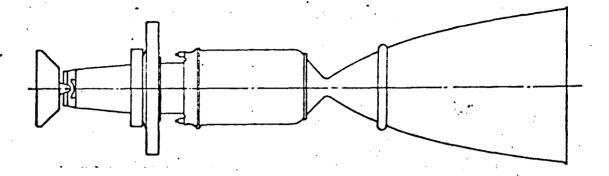


f = 40.74 Hz

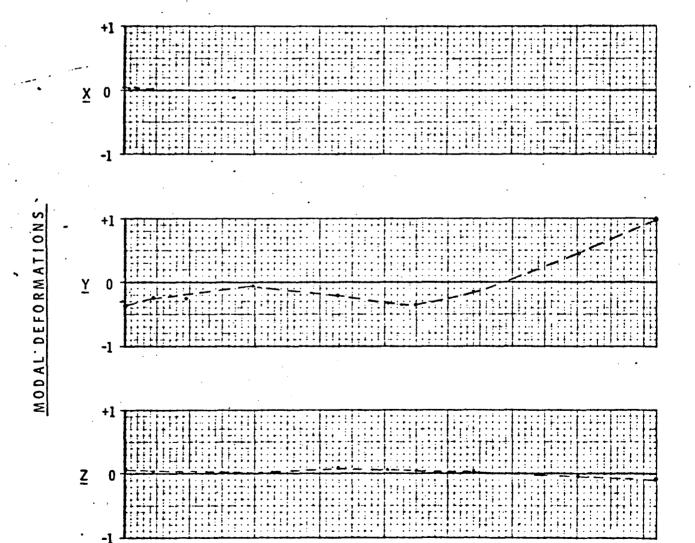


ENGINE STATION - INCHES

FIGURE 9-6



f = 41.13 Hz



200

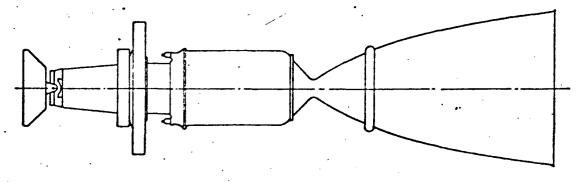
ENGINE STATION - INCHES

100

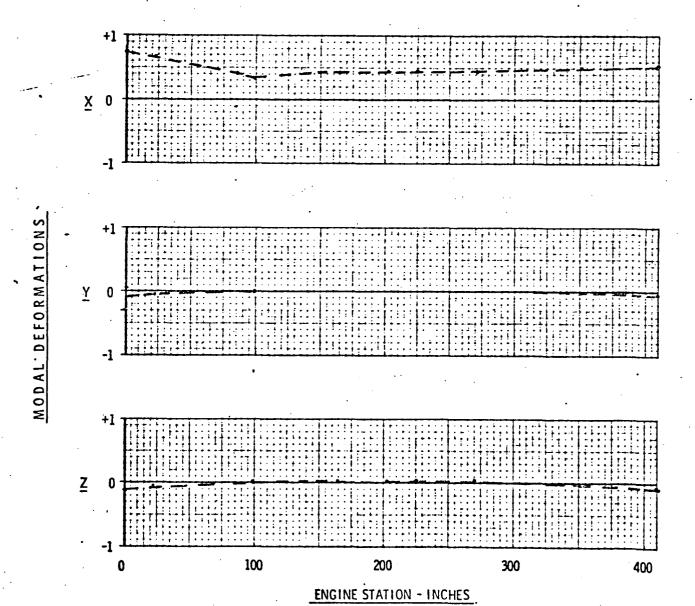
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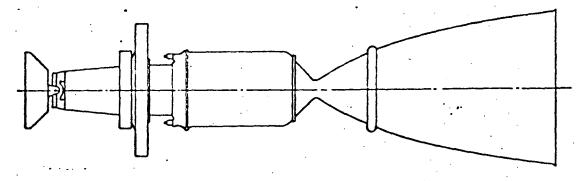
400

FIGURE 9-7



f = 46.23 Hz





f = 49.96 Hz

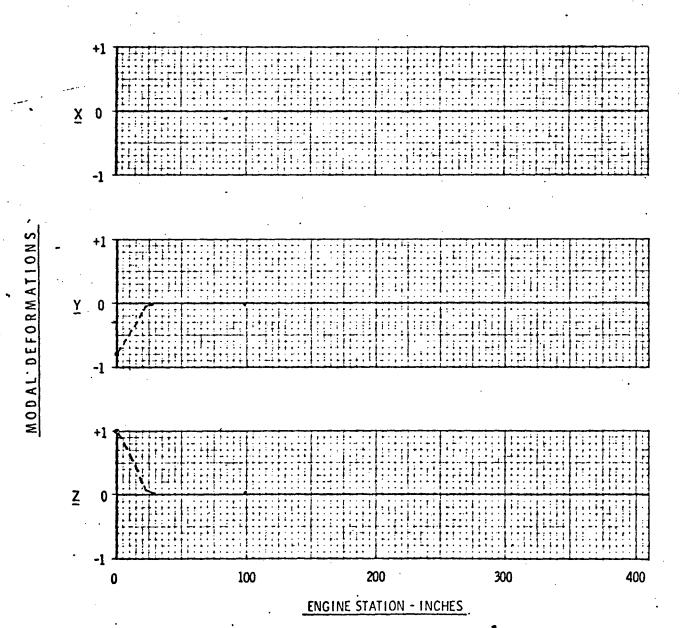
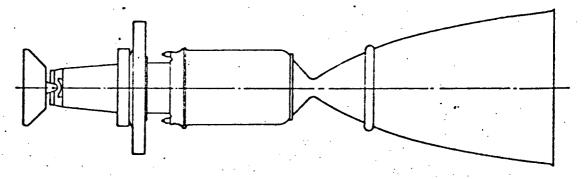
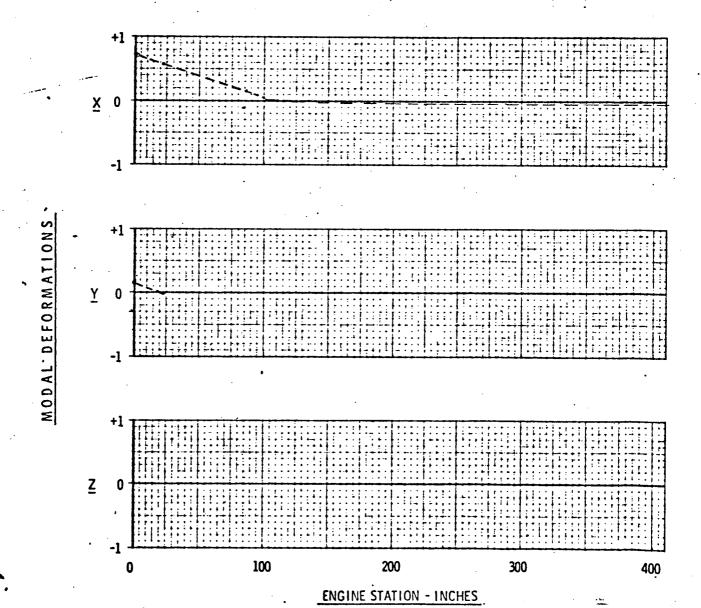
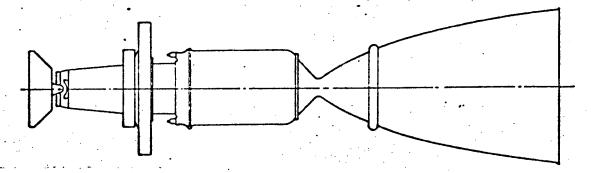


FIGURE 9-9



f = 62.90 Hz





f = 72.48 Hz

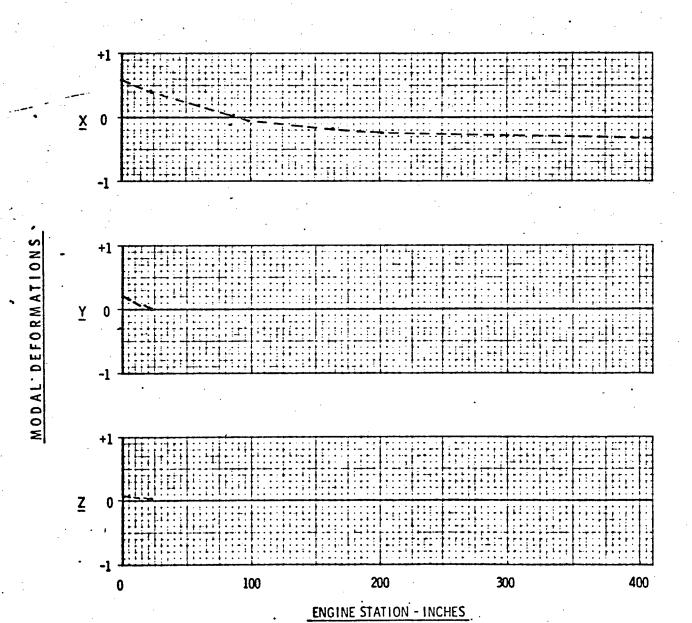
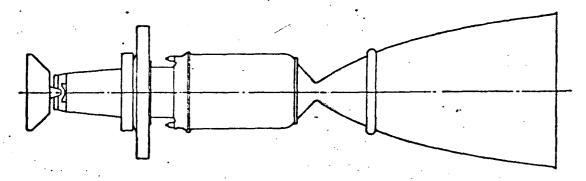
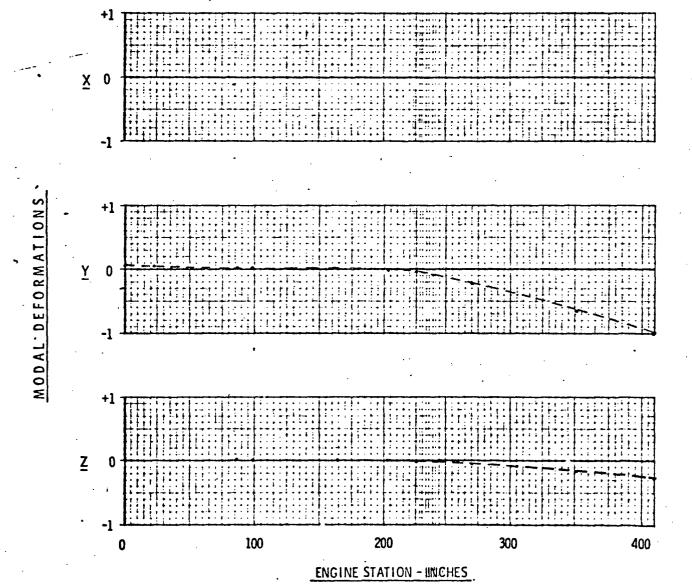
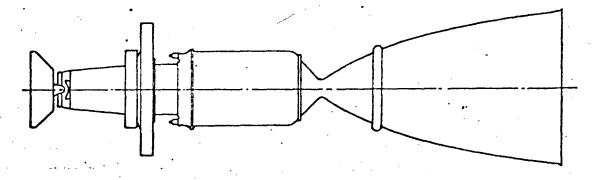


FIGURE 10-1

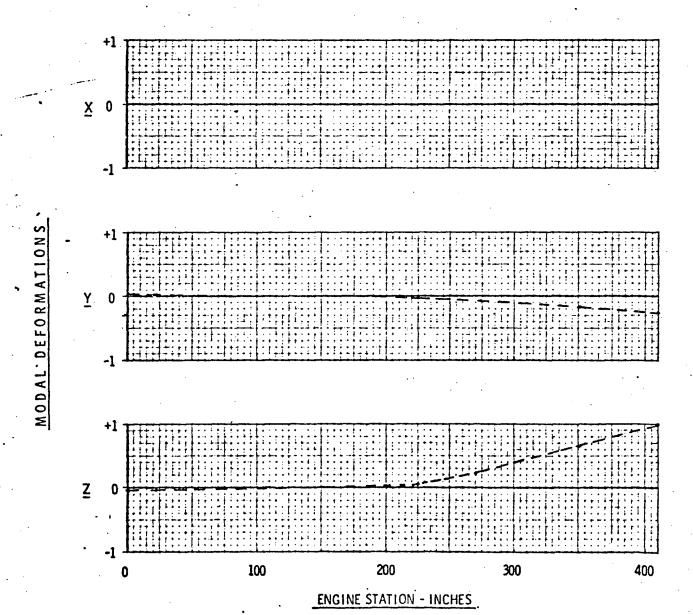


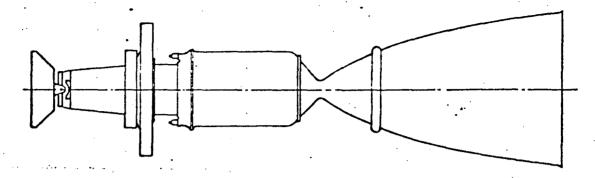
f = 23.944 Hz



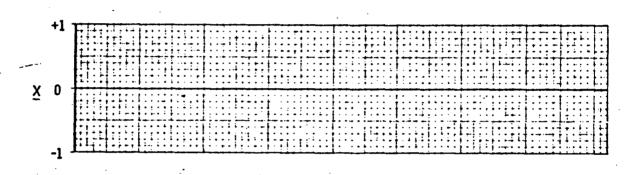


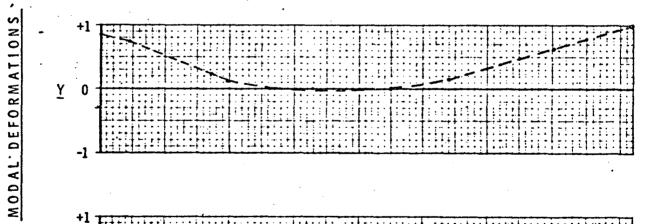
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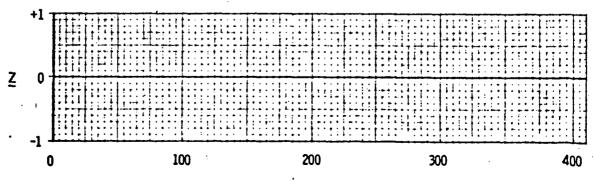




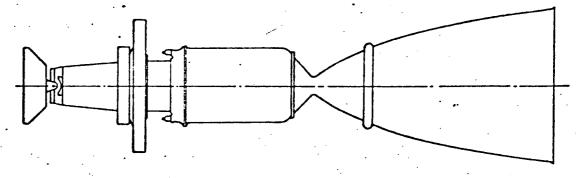
f = 27.494 Hz







ENGINE STATION - INCHES



f = 31.428 Hz

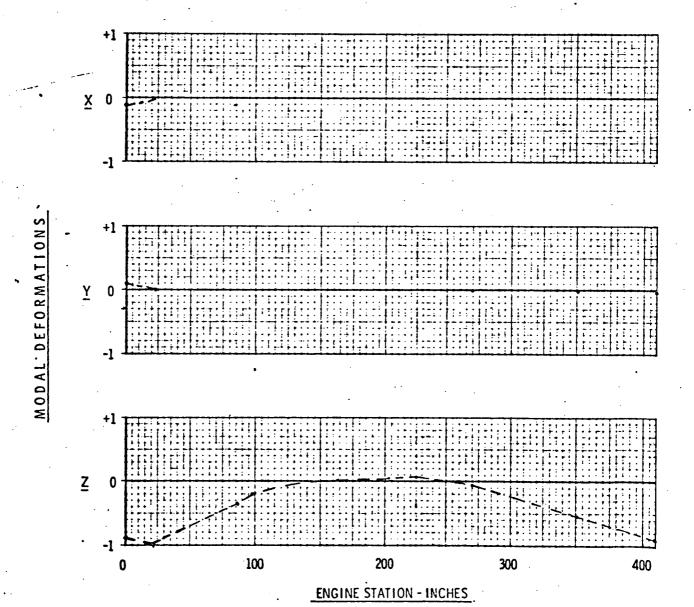
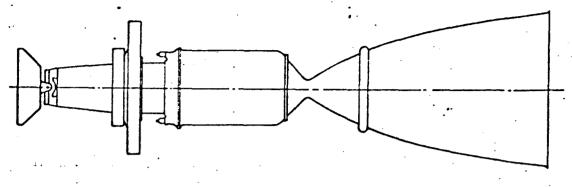
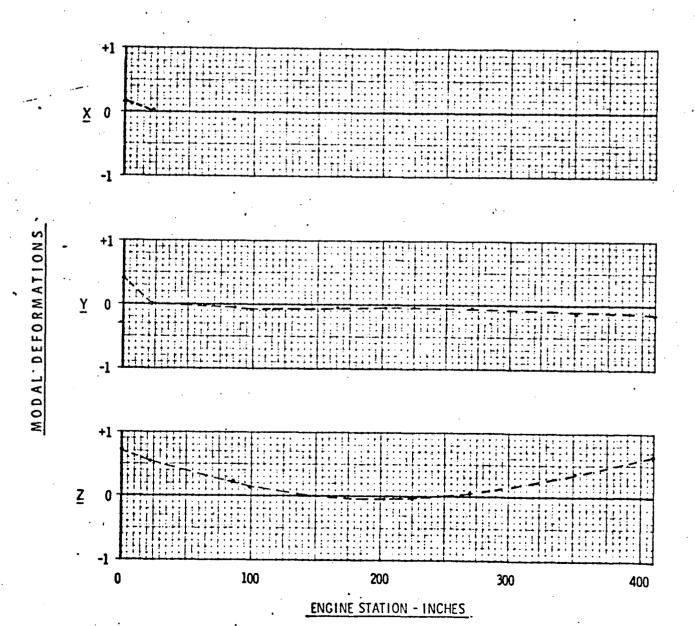
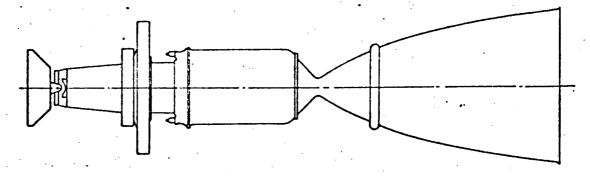


FIGURE 10-5

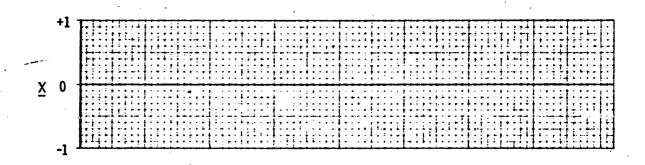


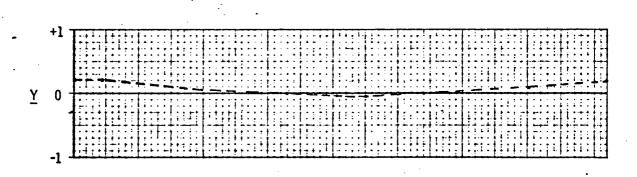
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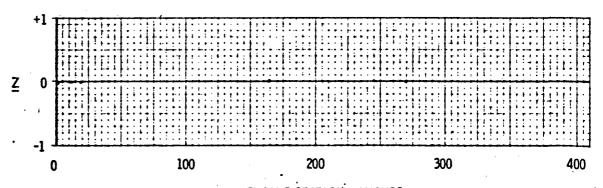


f = 36.942 Hz

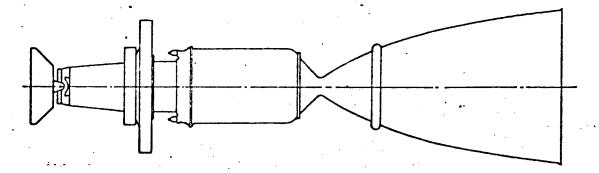




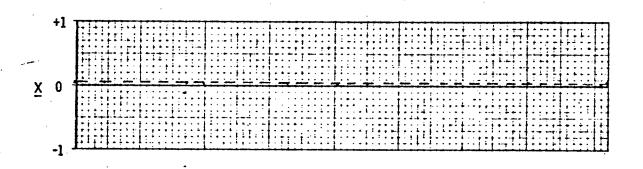
MODAL DEFORMATIONS

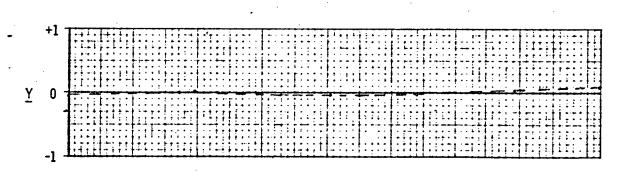


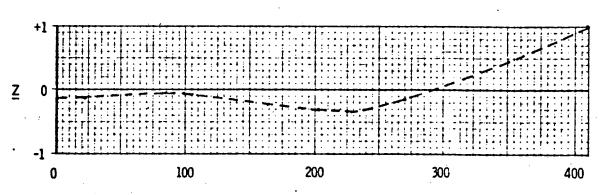
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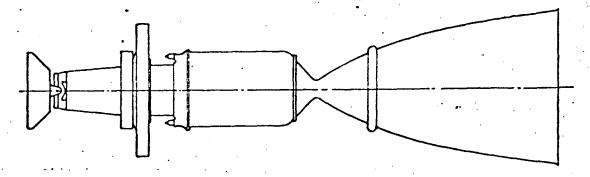
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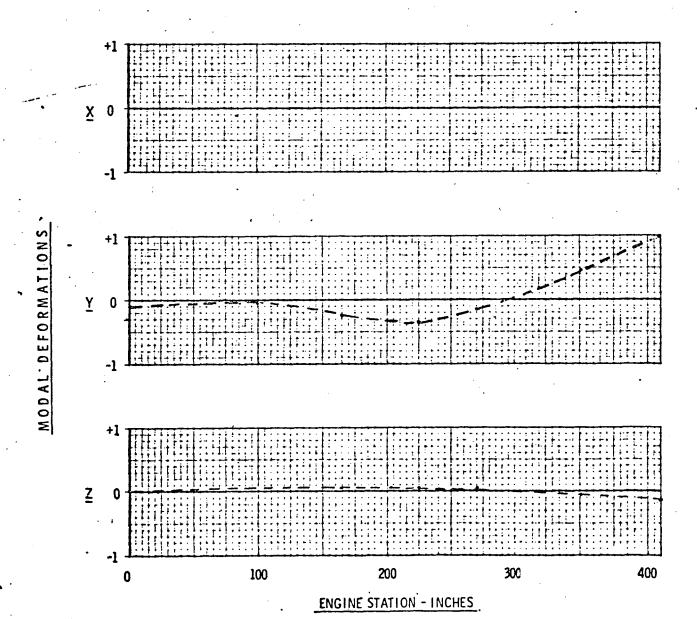


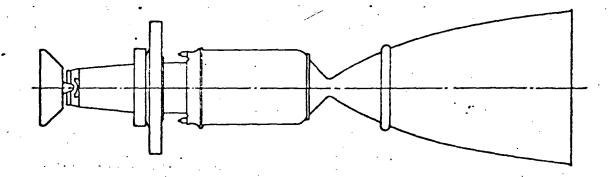


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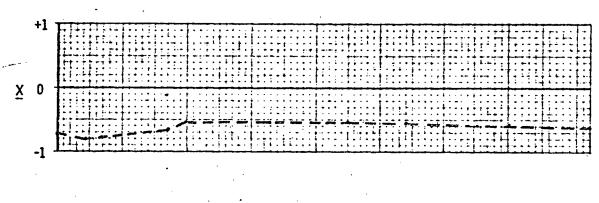


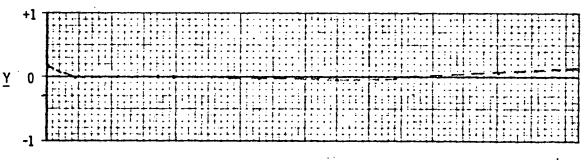
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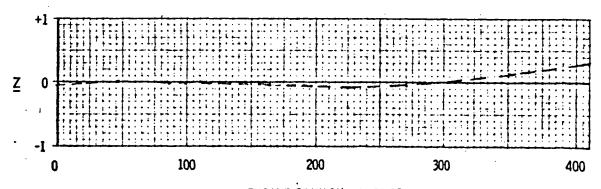


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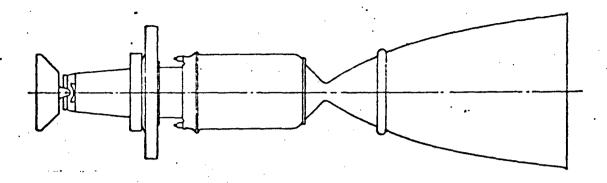




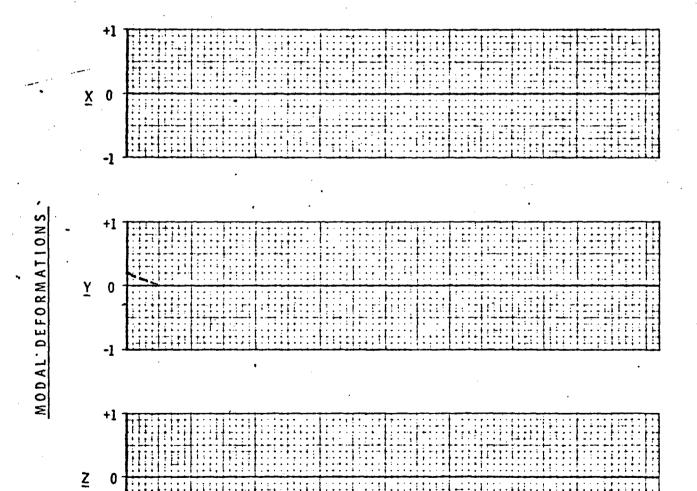
MODAL DEFORMATIONS



ENGINE STATION - INCHES



f = 56.98 Hz



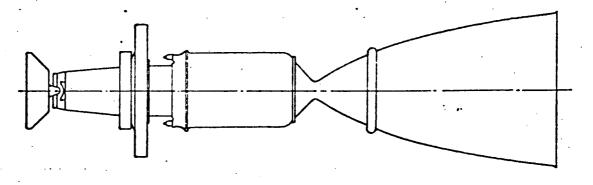
ENGINE STATION - INCHES

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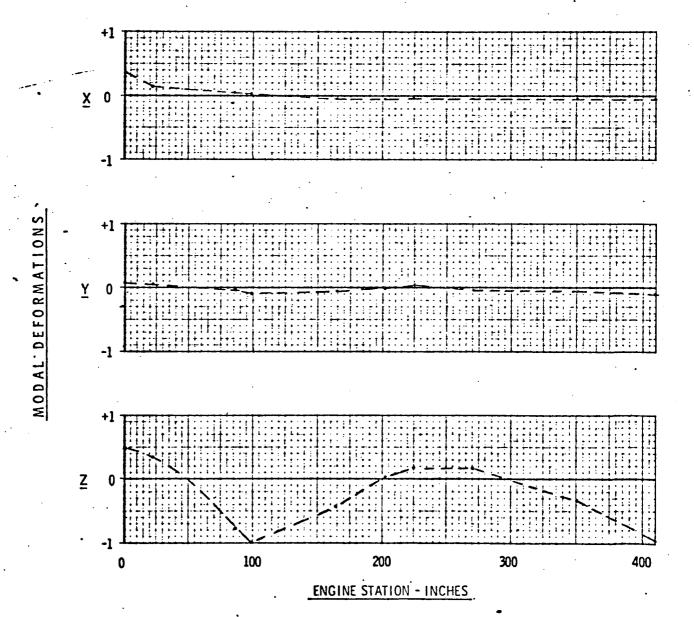
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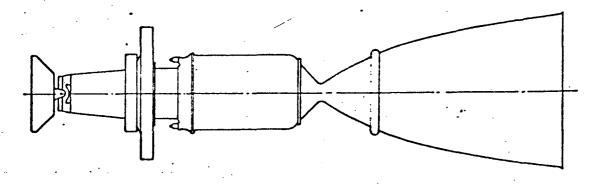
200

100

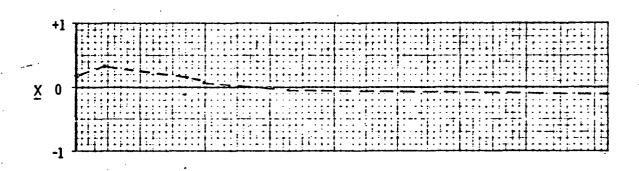


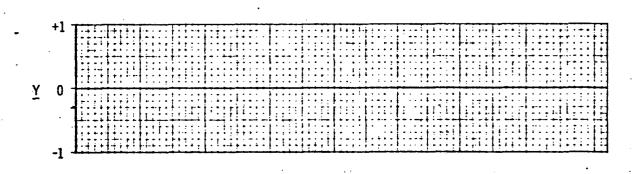
f = 58.98 Hz

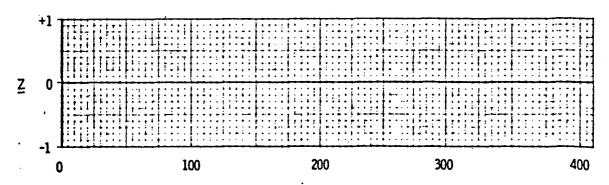




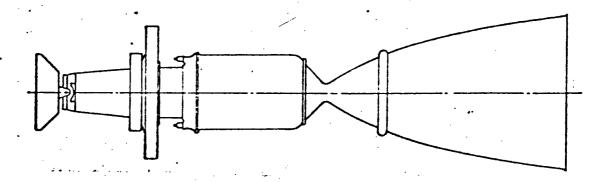
f = 61.02 Hz



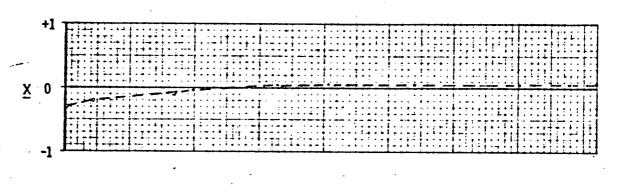


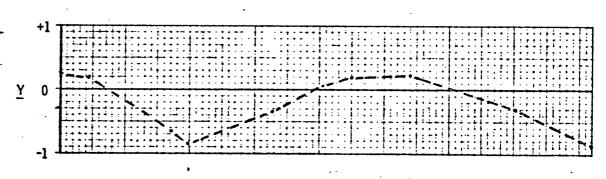


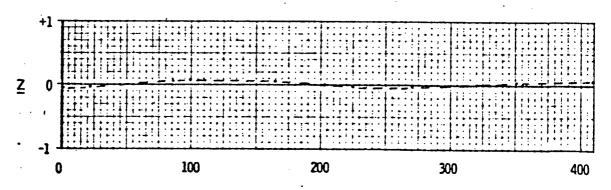
ENGINE STATION - INCHES



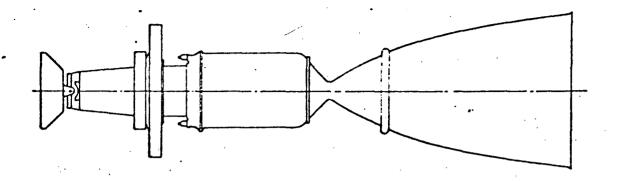
f = 61.4 Hz



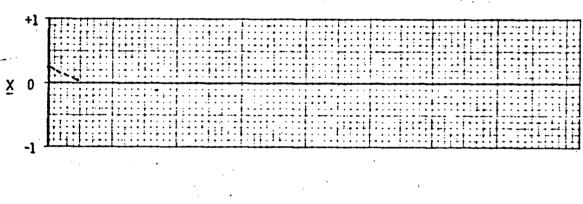


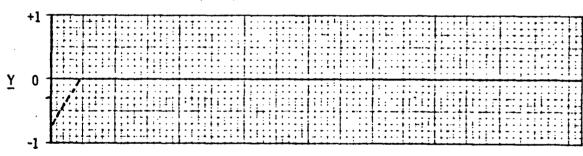


ENGINE STATION - INCHES

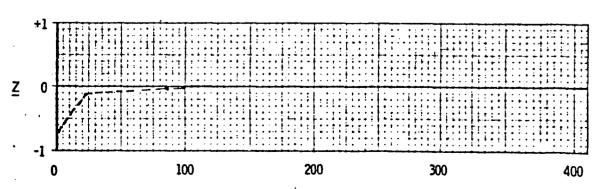


 $\dot{f} = 63.15 \text{ Hz}$

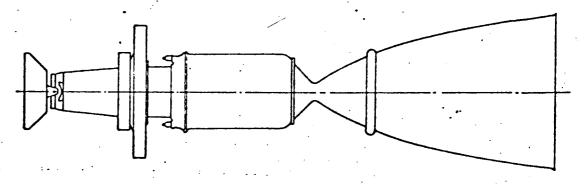




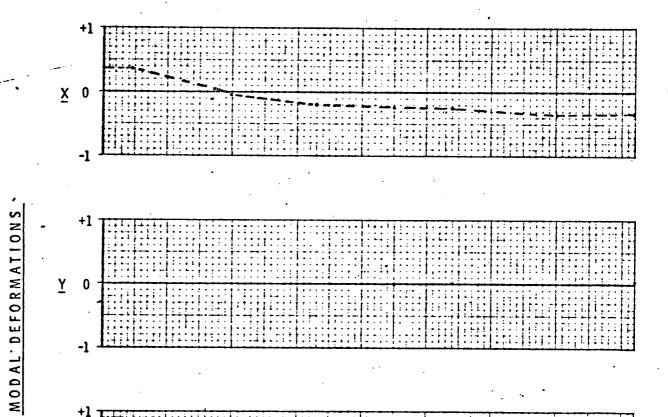
MODAL DEFORMATIONS

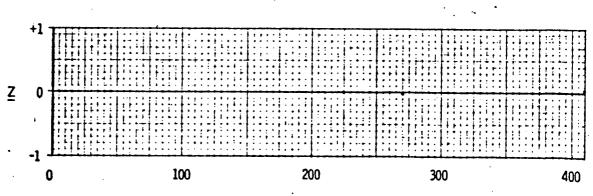


ENGINE STATION - INCHES

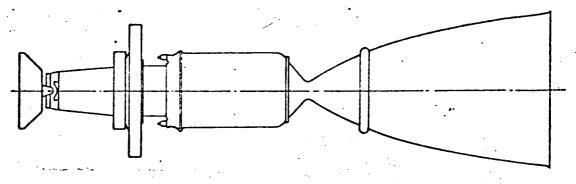


f = 72.96 Hz

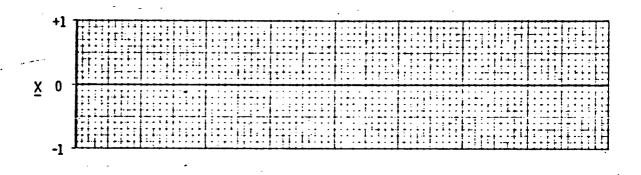


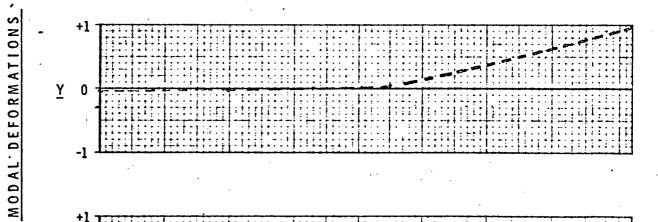


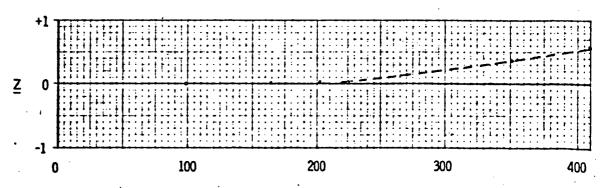
ENGINE STATION - INCHES



f = 24.074 Hz

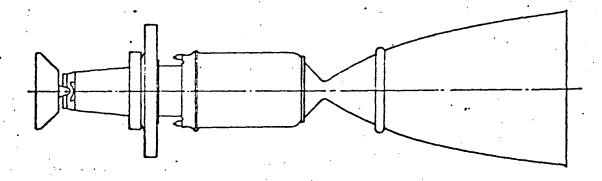




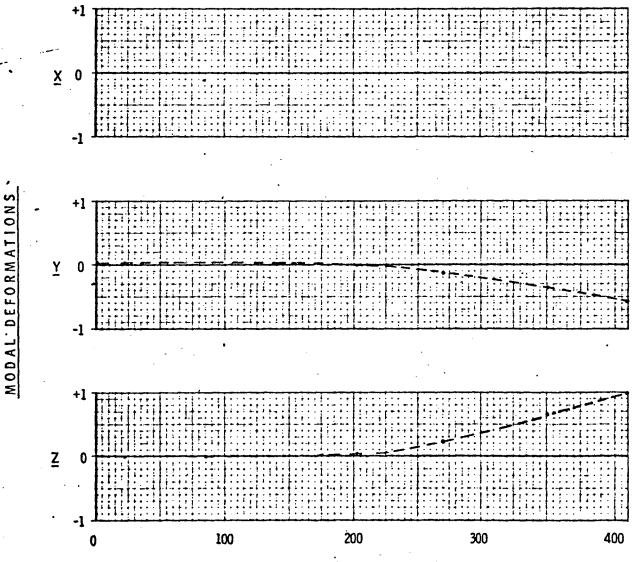


ENGINE STATIO'I - INCHES

FIGURE 11-2

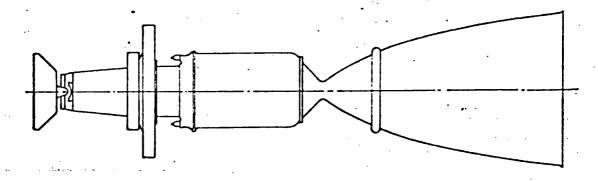


f = 24.141 Hz

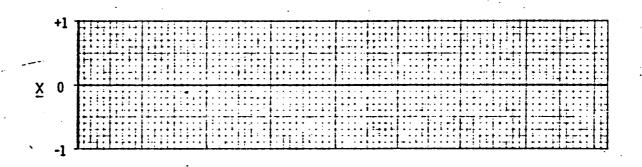


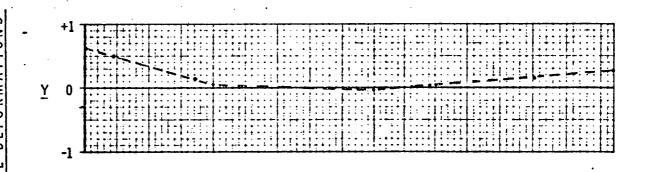
ENGINE STATION - INCHES

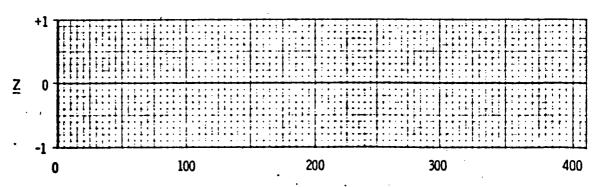
FIGURE 11-3



f = 31.28 Hz

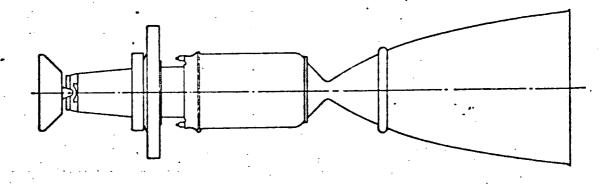




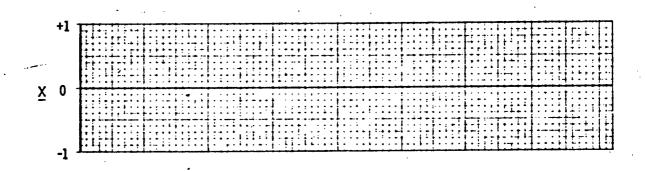


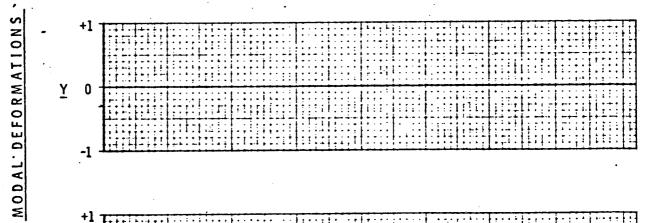
ENGINE STATION - INCHES

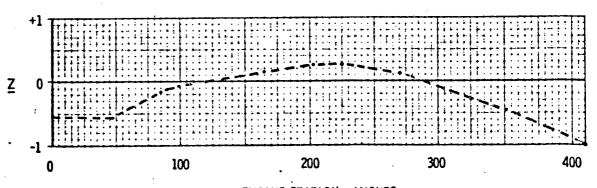
FIGURE 11-4



f = 39.26 Hz

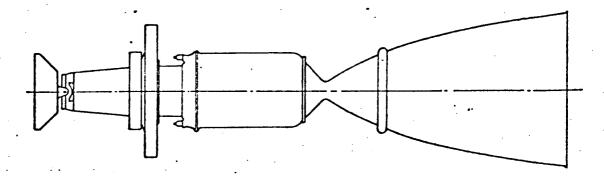




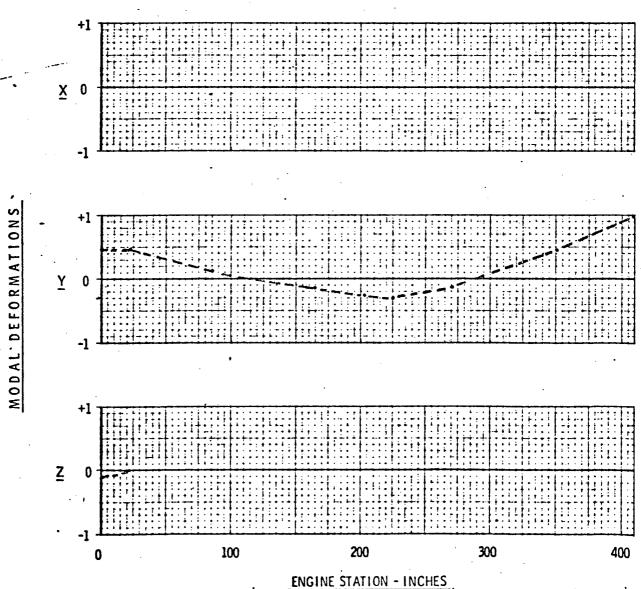


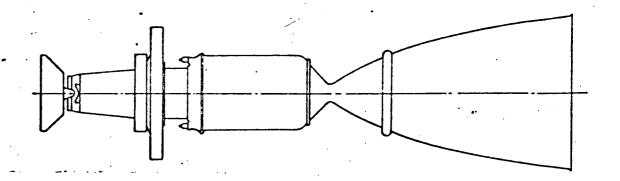
ENGINE STATION - INCHES

FIGURE 11-5

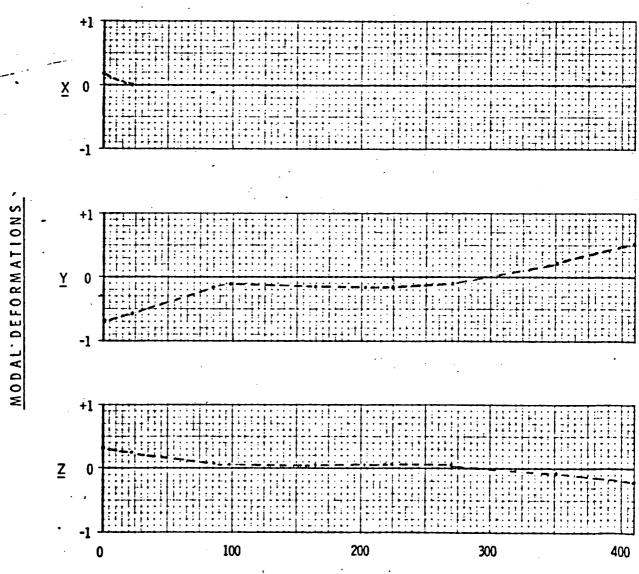


f = 40.28 Hz

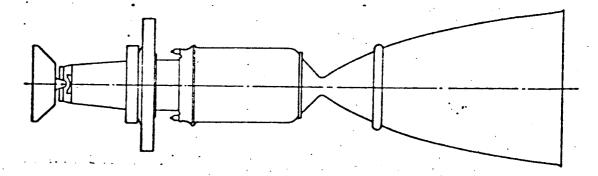




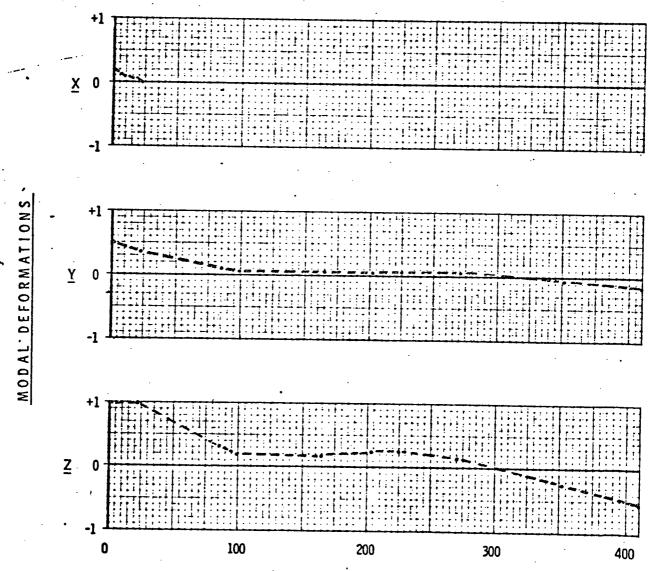
f = 41.95 Hz



ENGINE STATION - INCHES

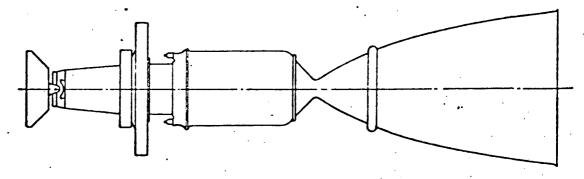


f = 42.25 Hz

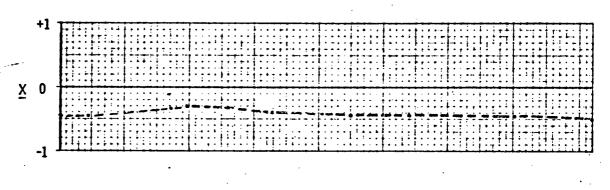


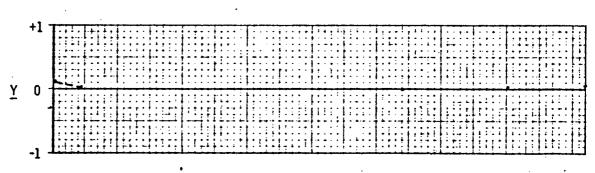
ENGINE STATION - INCHES

FIGURE 11-8

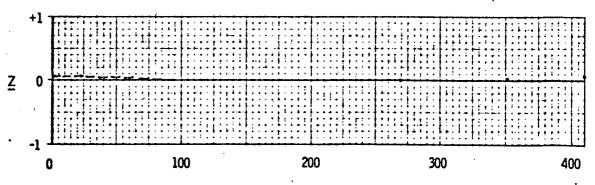


f = 47.54 Hz



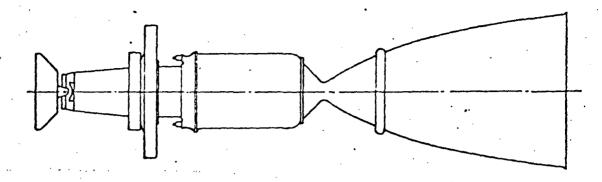


MODAL DEFORMAT

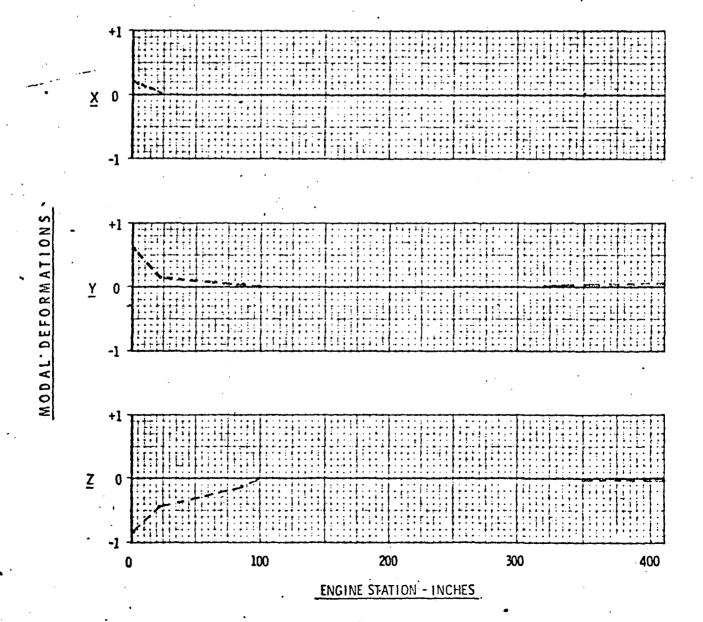


ENGINE STATION - INCHES

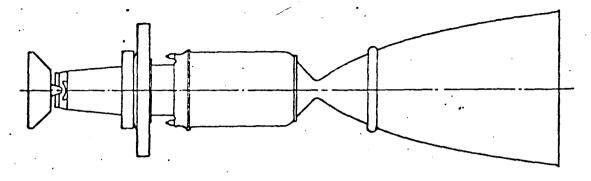
FIGURE 11-9



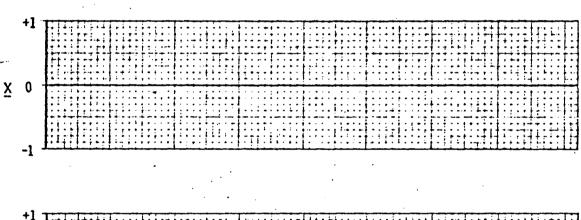
f = 54.38 Hz

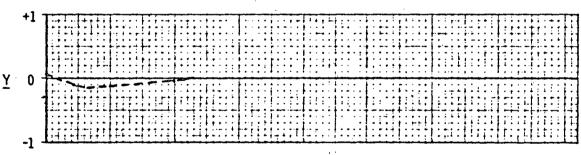


' FIGURE 11-10

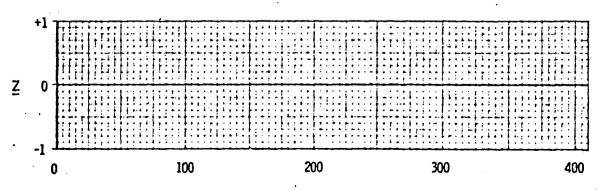


f = 59.09 Hz



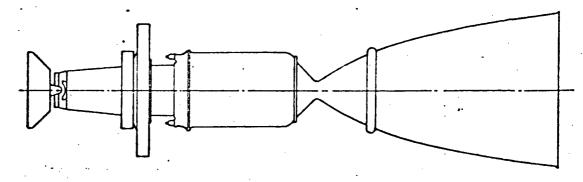


MODAL DEFORMATIONS



ENGINE STATION - INCHES

FIGURE 11-11



f = 64.78 Hz

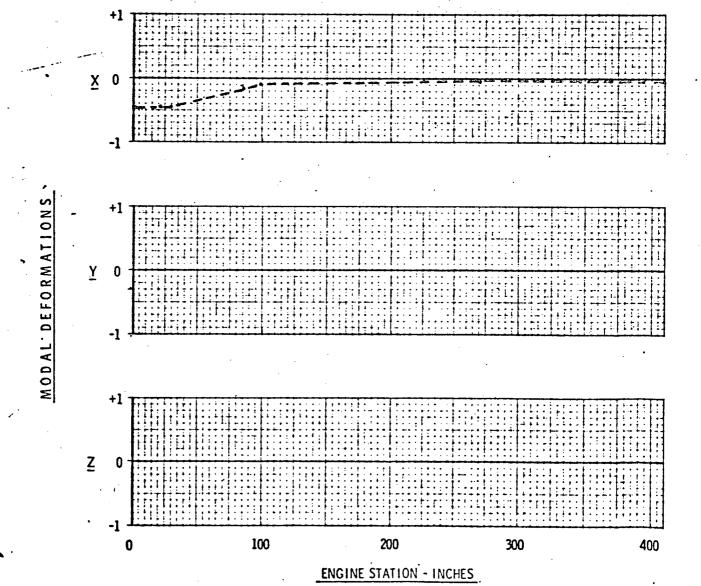
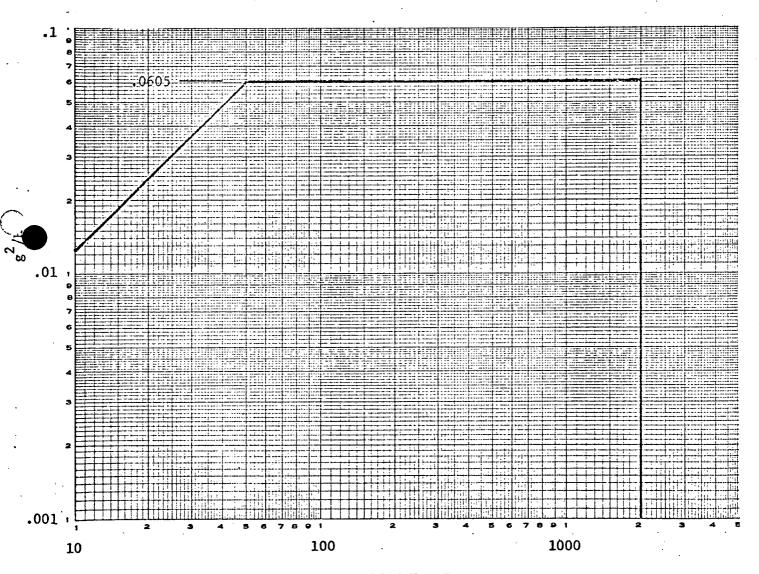


FIGURE 12

NERVA TPA INPUT ACCELERATION SPECTRA

g²/Hz vs. Hz

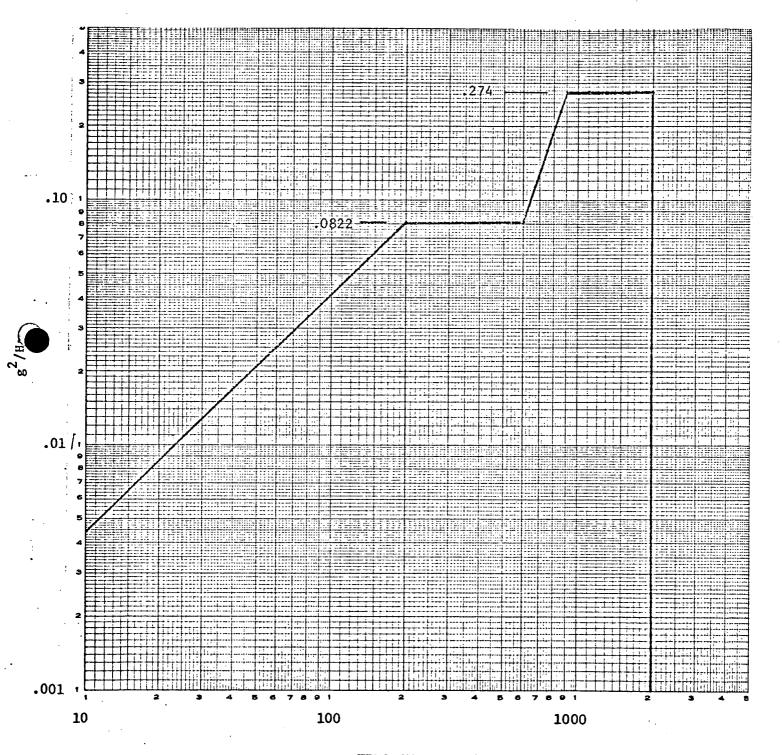


FREQUENCY - Hz

FIGURE 13

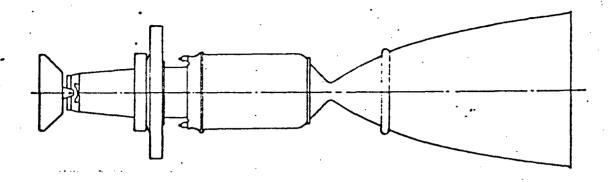
NERVA NOZZLE MANIFOLD INPUT ACCELERATION SPECTRA

g²/Hz vs. Hz



FREQUENCY - Hz

FIGURE 14-1



f = 2.074 Hz

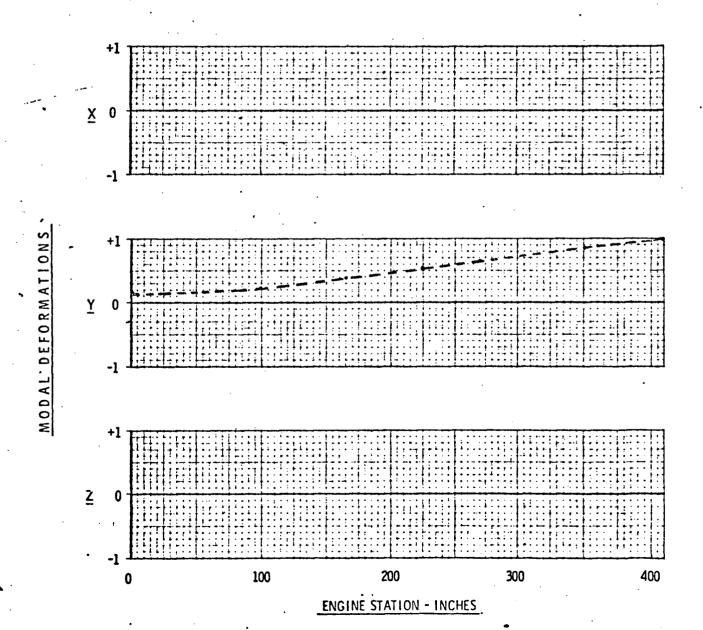
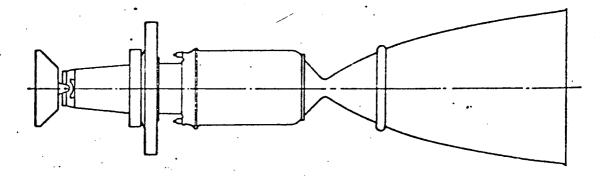


FIGURE 14-2



f = 2.322 Hz

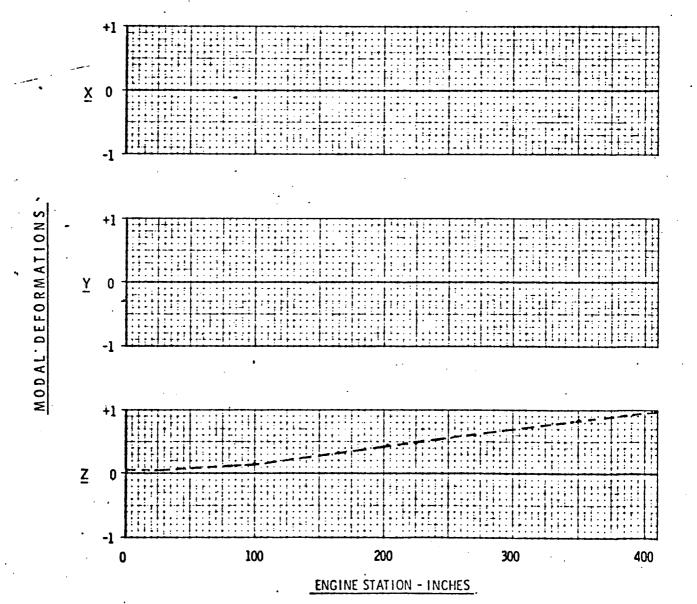
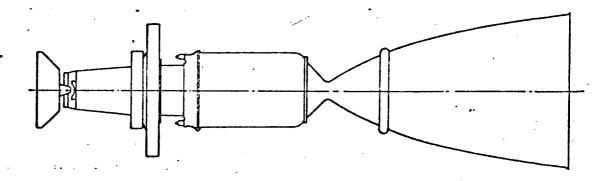


FIGURE 14-3



f = 2.858 Hz

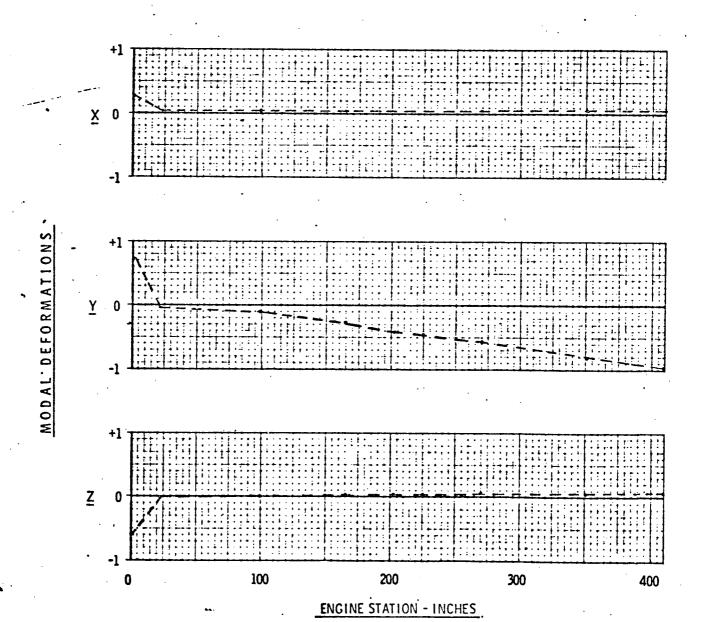
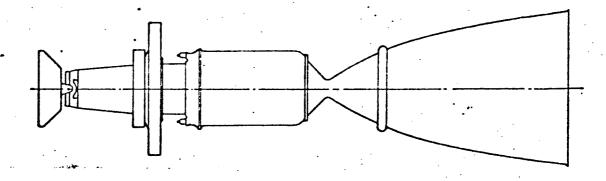
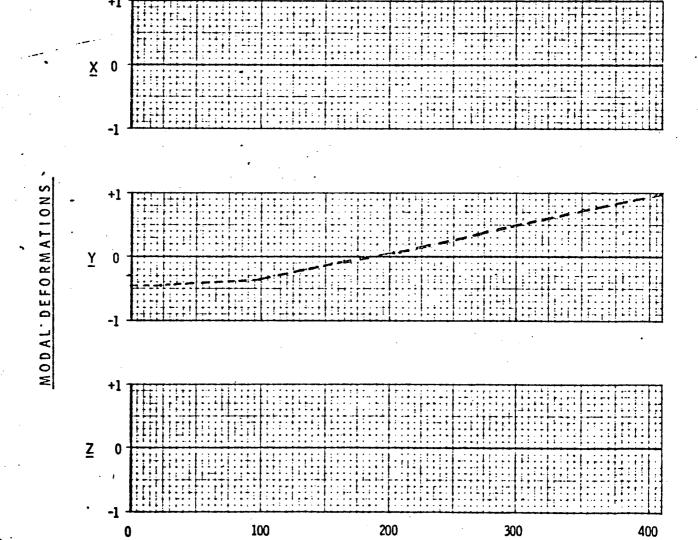


FIGURE 14-4

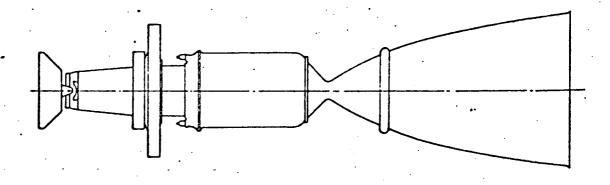


f = 6.897 Hz



ENGINE STATION - INCHES

FIGURE 14-5



 $\dot{f} = 8.457 \text{ Hz}$

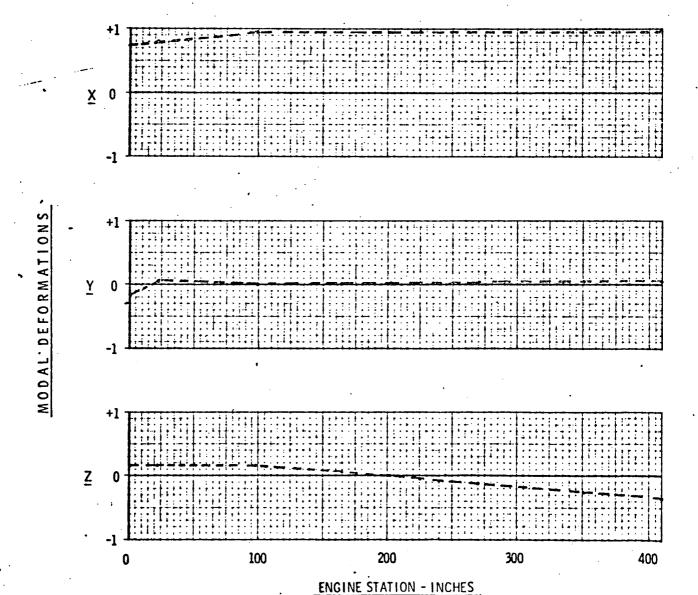
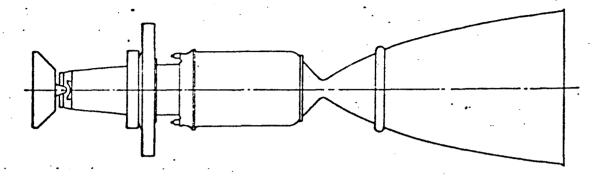


FIGURE 14-6



f = 9.561 Hz

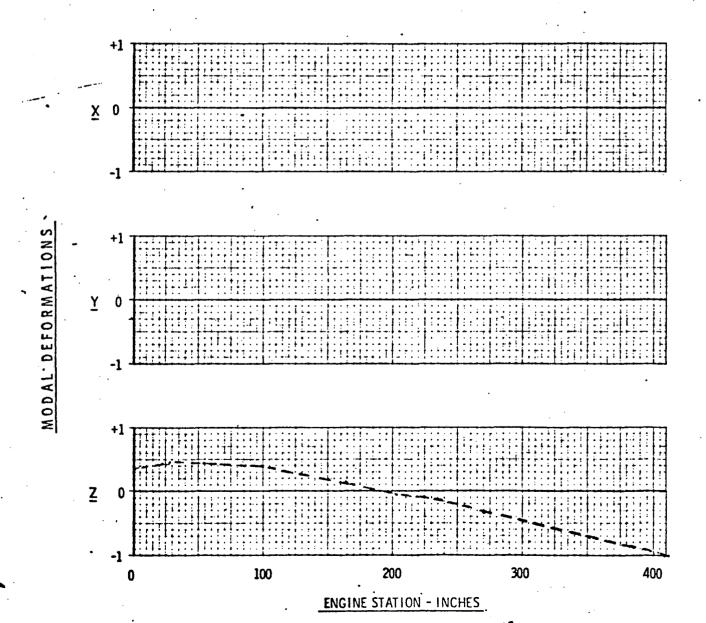
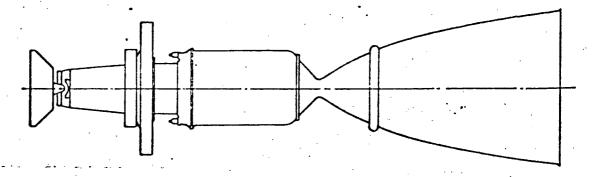
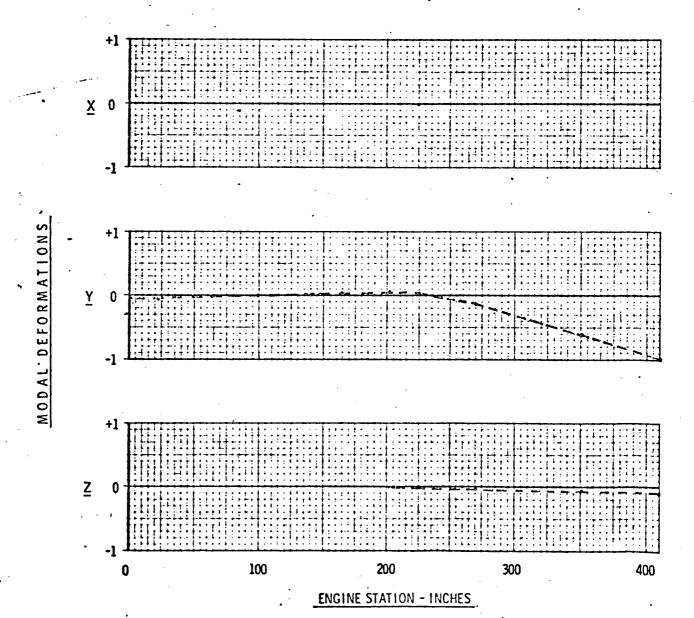
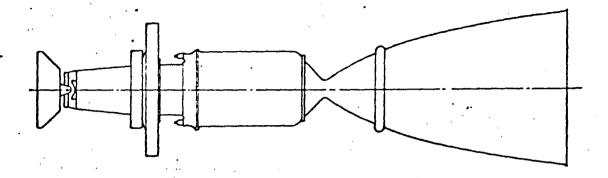


FIGURE 14-7

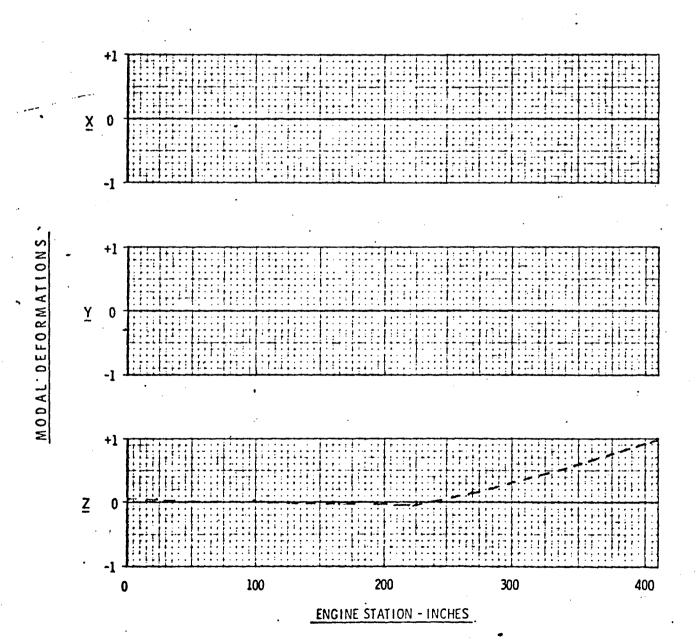


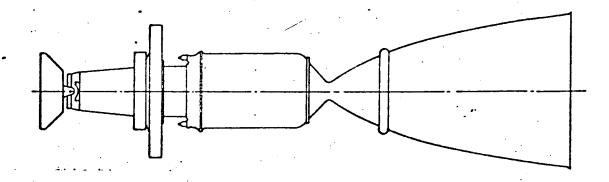
f = 27.076 Hz





f = 27.422 Hz





f = 33.507 Hz

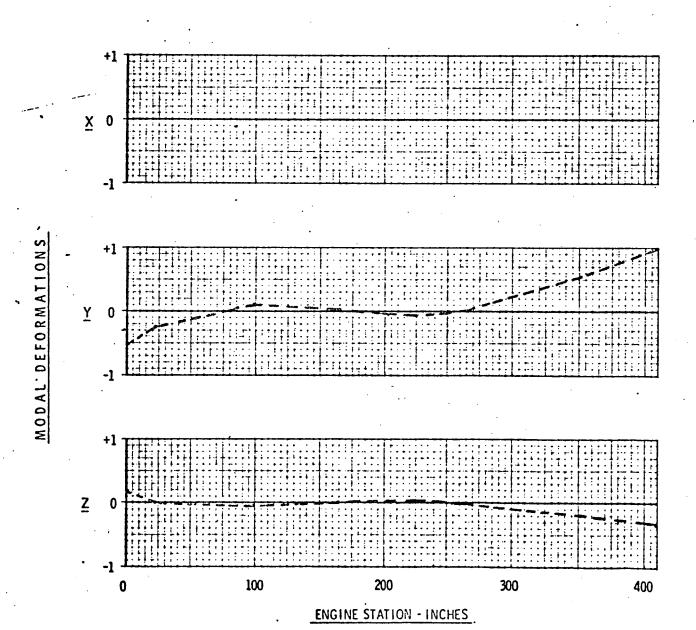
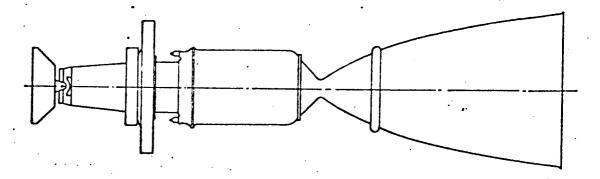
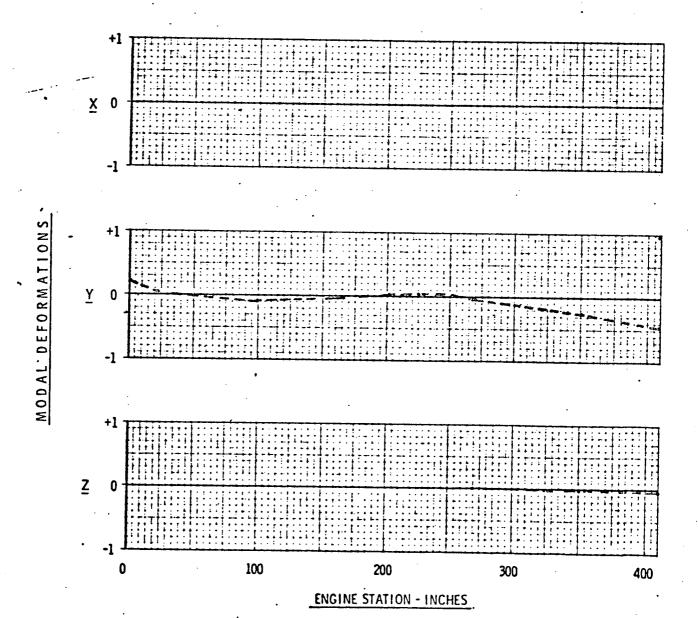
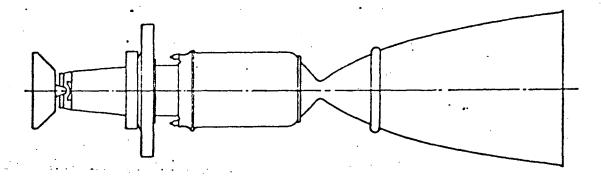


FIGURE 14-10

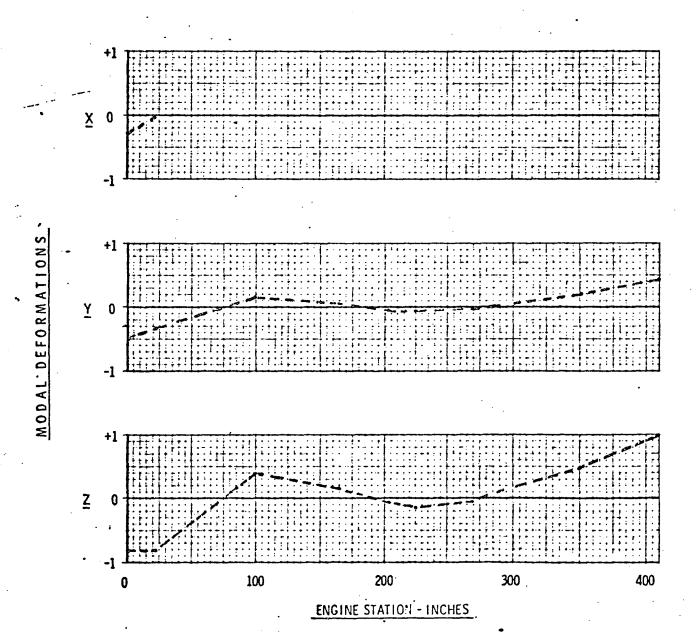


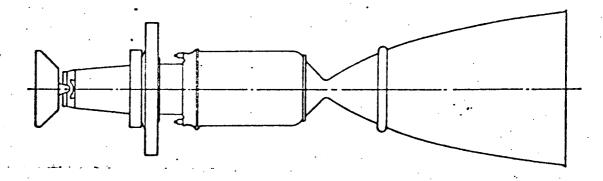
f = 34.877 Hz





f = 43.085 Hz





f = 43.482 Hz

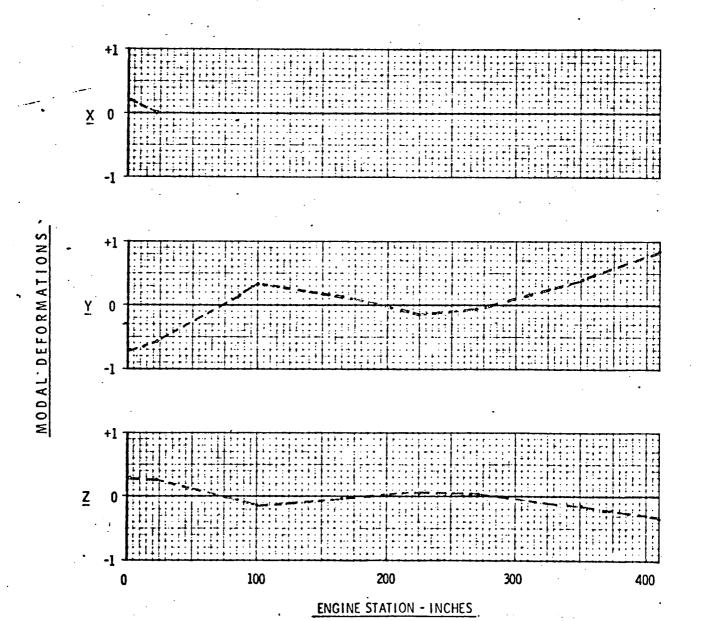
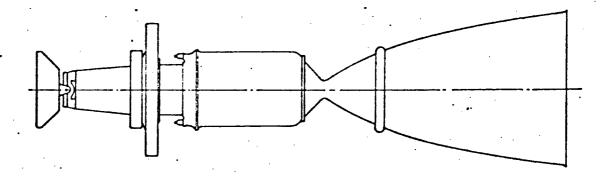


FIGURE 14-13



f = 57.358 Hz

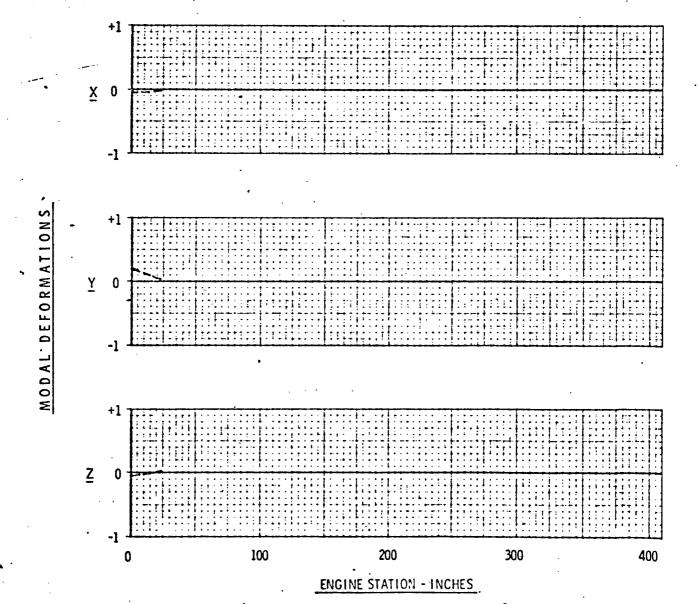
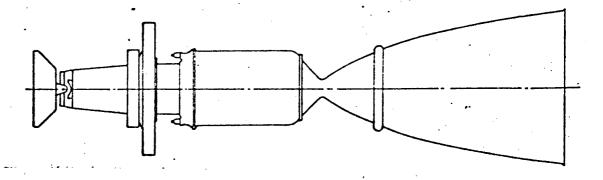
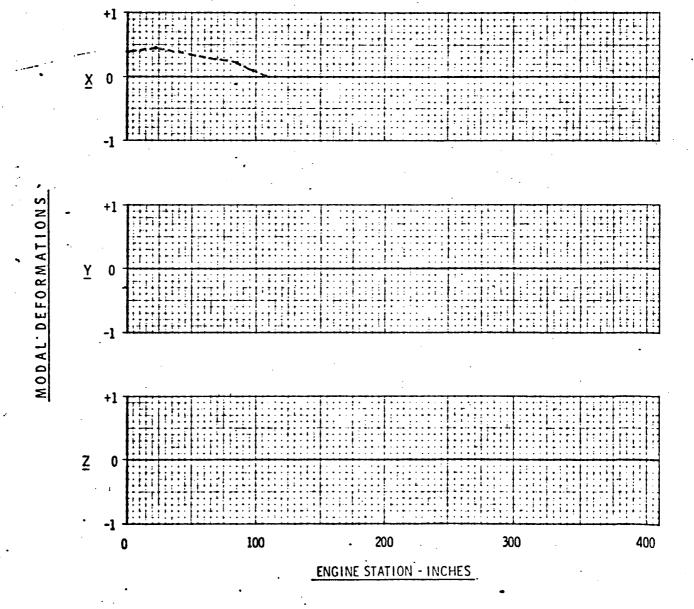
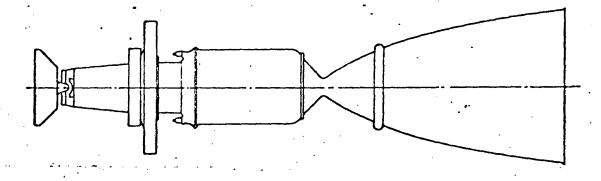


FIGURE 14-14

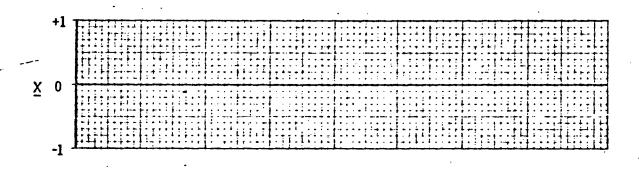


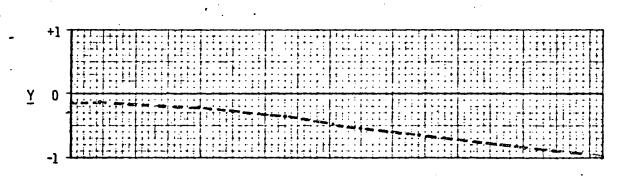
f = 59.147 Hz



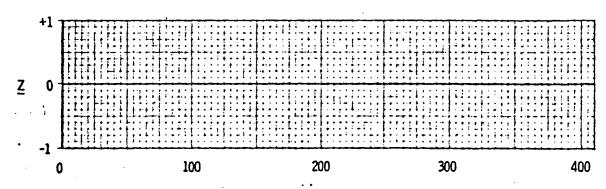


f = 2.162 Hz



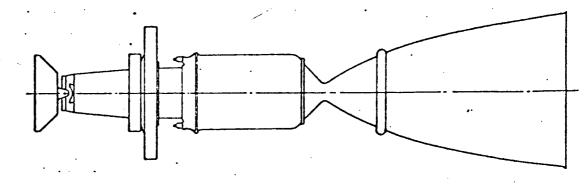


MODAL DEFORMAT

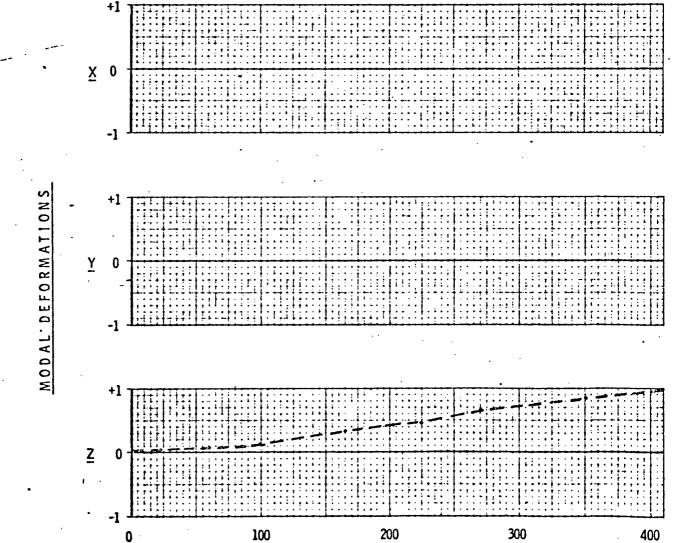


ENGINE STATION - INCHES

FIGURE 15-2

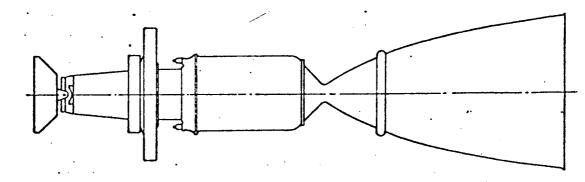


f = .2.369 Hz

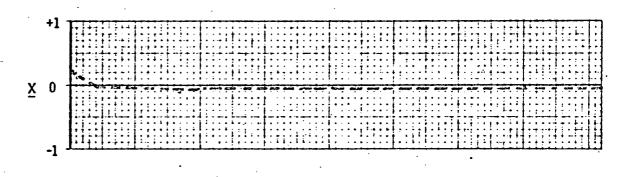


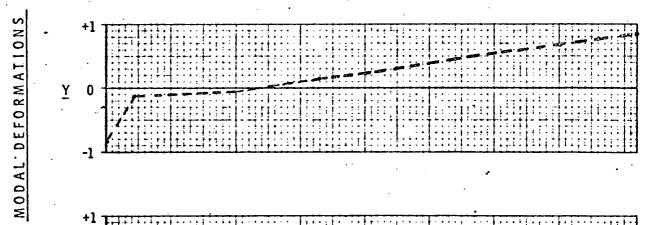
ENGINE STATION - INCHES

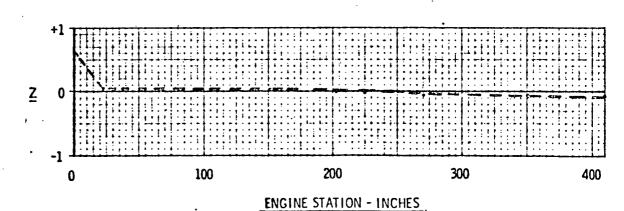
FIGURE 15-3

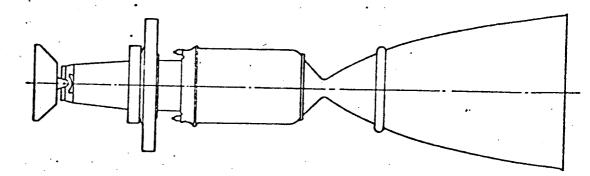


f = .3.966 Hz









f = .9.291 Hz

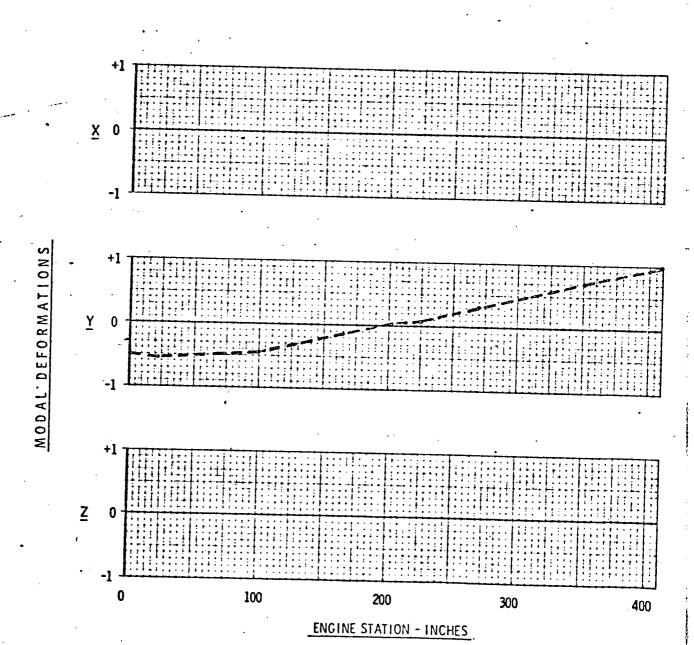
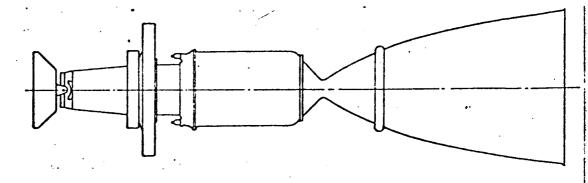
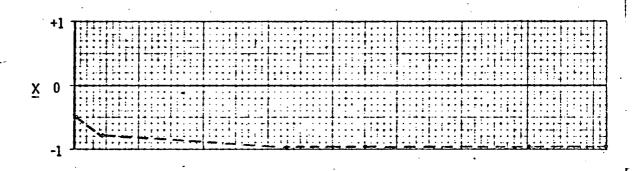
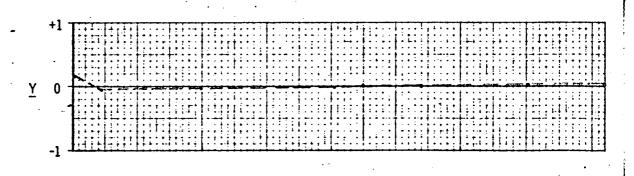


FIGURE 15-5

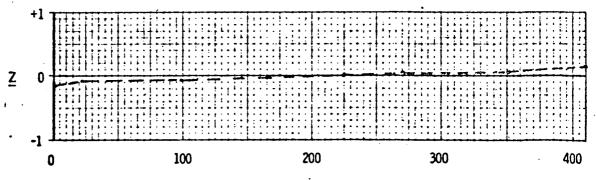


f = 9.931 Hz



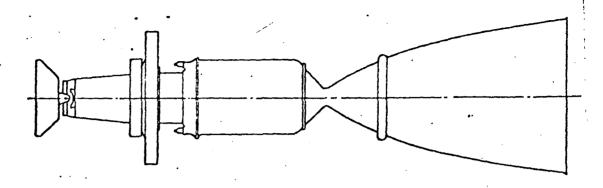


MODAL DEFORMATIONS

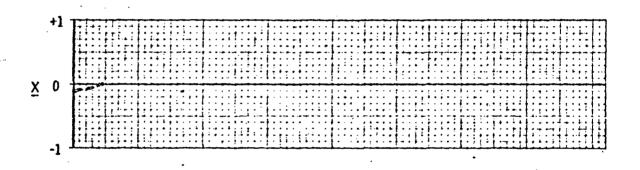


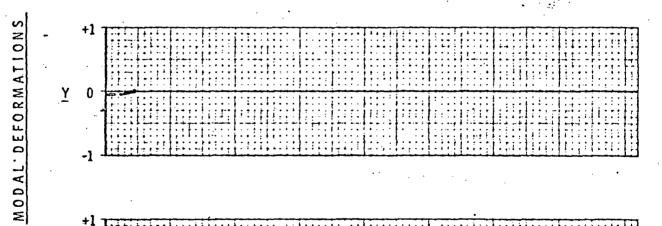
ENGINE STATION - INCHES

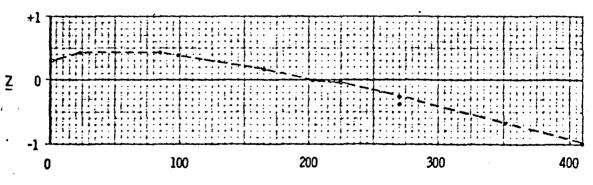
FIGURE 15-6



f = .14.144 Hz

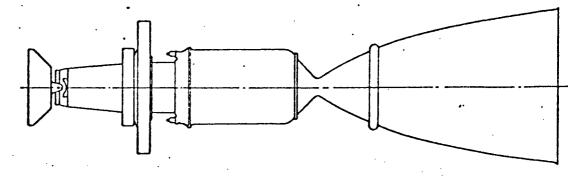




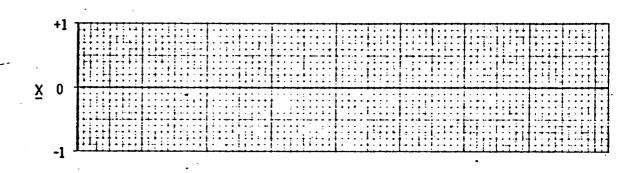


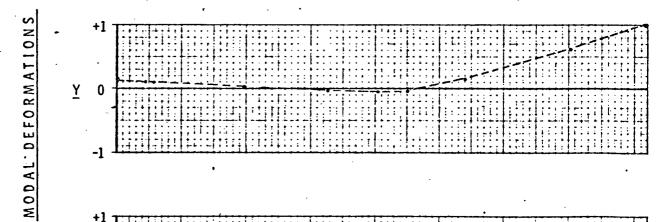
ENGINE STATION - INCHES

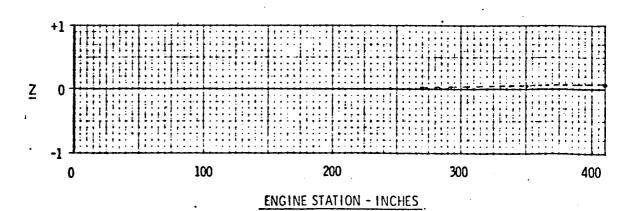
FIGURE 15-7

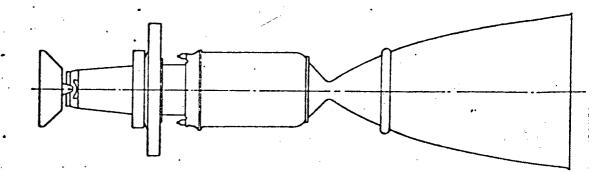


f = .27.835 Hz

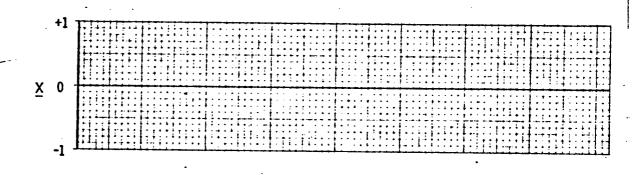


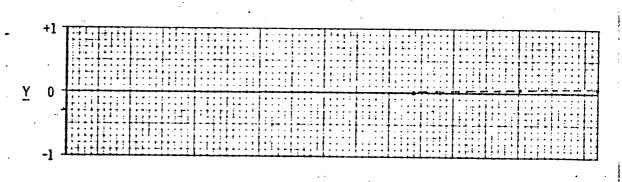




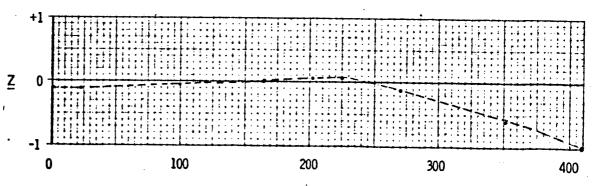


f = .28.592 Hz



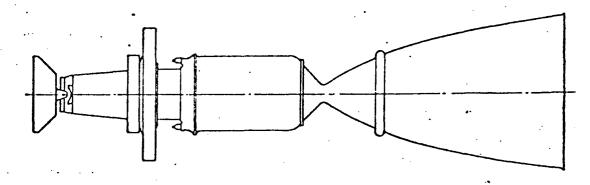


MODAL DEFORMATION

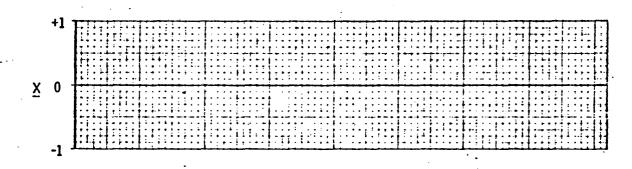


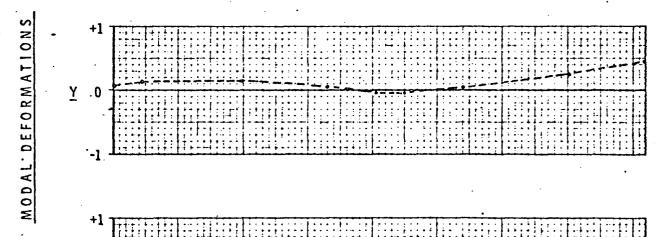
ENGINE STATION - INCHES

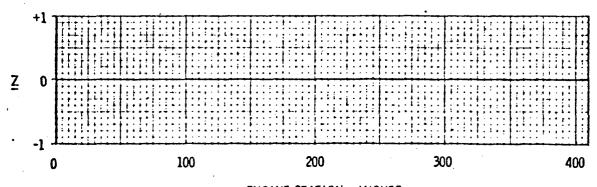
FIGURE 15-9



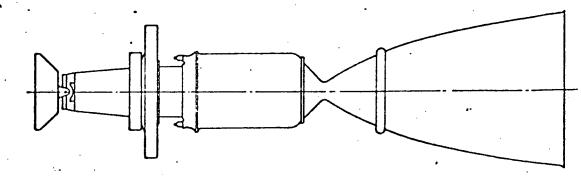
f = .36.321 Hz







ENGINE STATION - INCHES



f = .53.025 Hz

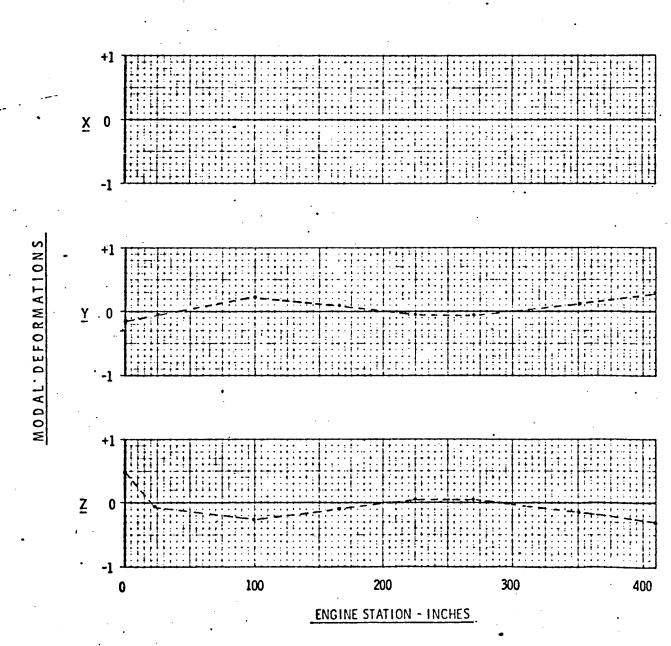
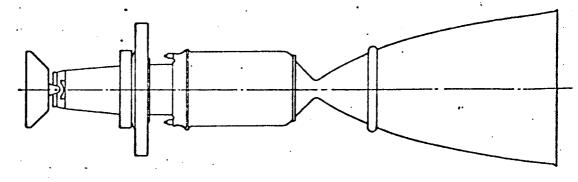
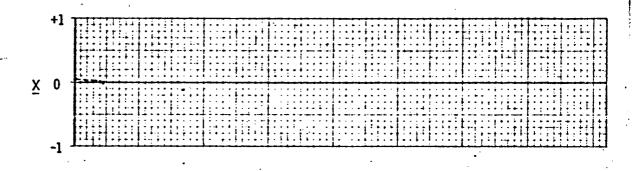
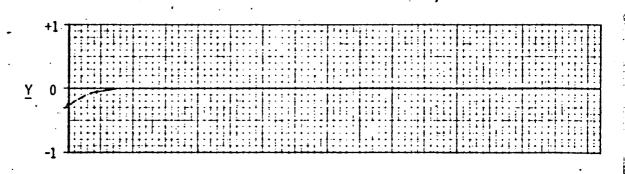


FIGURE 15-11

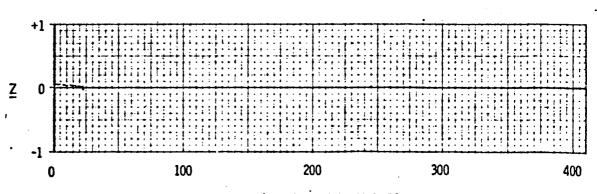


f = 56.869 Hz

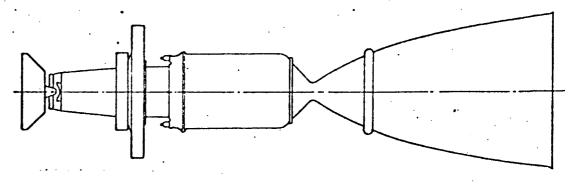




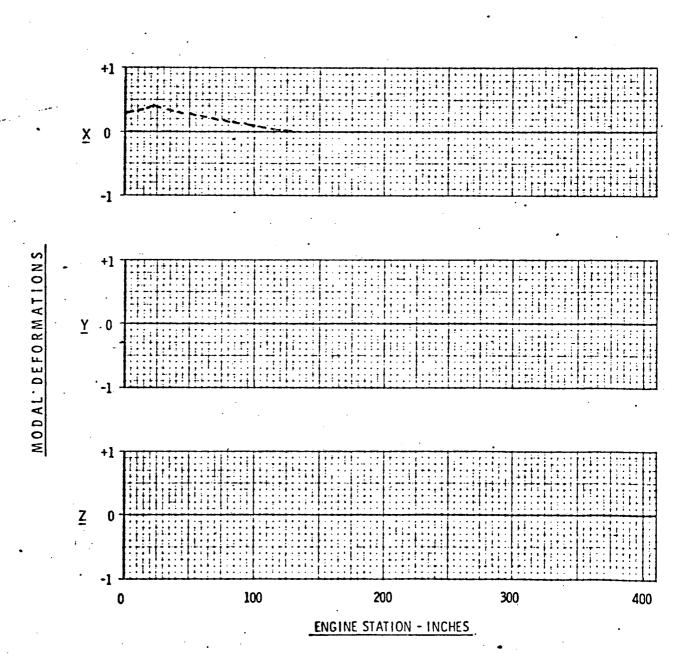
MODAL DEFORMATIONS

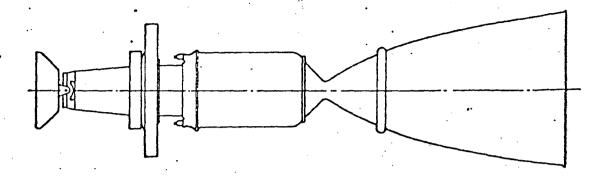


ENGINE STATION - INCHES

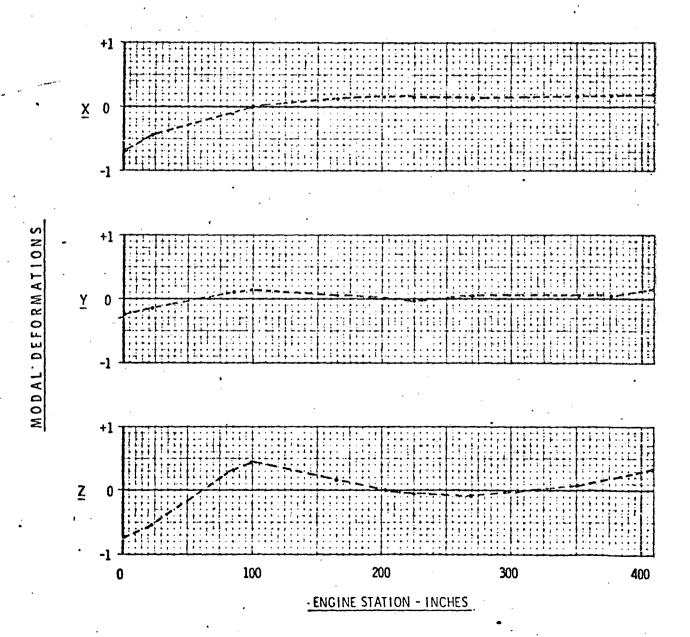


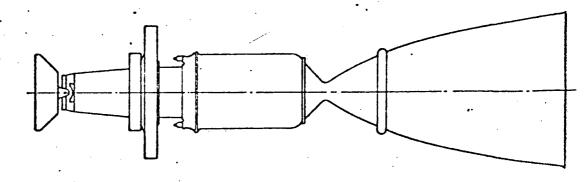
f = 63.558 Hz





f = .69.558 Hz





f = .71.857 Hz

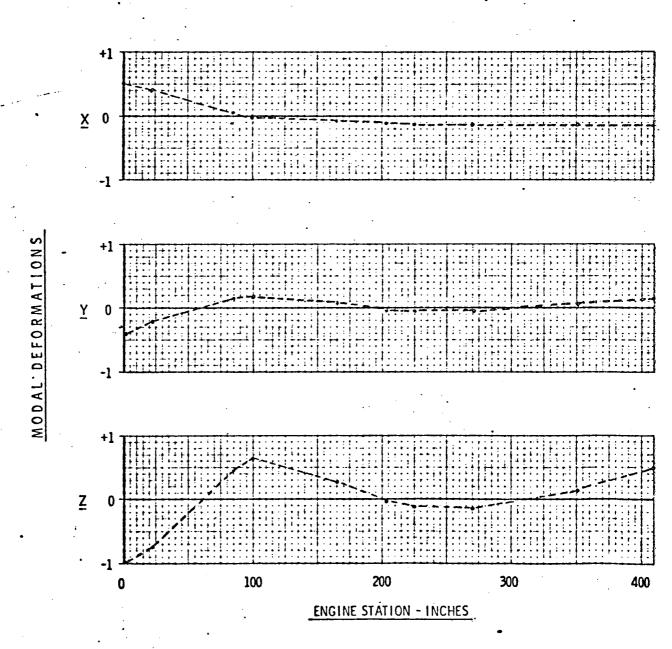


TABLE 1

400E THRUST TRAIN ANALYSES

	ENGINE ONLY	MINI-TANK
EOS	Case 1 & 2	Case 5 & 6
NSO .		Case 7 & 8

Odd number cases are with shield

Even " " without shield

TABLE 2

SUMMARY OF ENGINE NATURAL FREQUENCIES

0 - 100 Hz

CONFIGURATION:]	EOS		EOS	NSO		
n/case	1_	2	5	6	7	8	
1	23.908	24.062	23.944	24.074	2.074	2.162	
2	23.968	24.121	24.053	24.141	2.322	2.369	
3	27.9 84	35.409	27.494	31.28	2.858	3.966	
4	28.093	35.74	31.428	39.26	6.897	9.291	
5	33.644	40.74	33.956	40.28	8.457	9.931	
6	40.02	41.13	36.942	41.95	9.561	14.144	
. 7	40.51	46.23	40.47	42.25	27.076	27.835	
8	40.87	49.96	40.91	47.54	27.422	28.592	
9	58.49	62.90	41.80	54.38	33.507	36.321	
10	58.85	72.48	56.98	59.09	34.877	53.025	
11	60.05	81.31	58.98	64.78	43.085	56.869	
12	61.13	101.49	61.02	73.11	43.482	63.672	
13	.72.47	· ·	61.4	101.26	57.358	69.558	
14	79.12	, 	63.15		59.147	71.857	
15	83.03		72.96		63.145	77.438	
16	87.03		84.64		69.430	101.248	
17	98.26		92.0		84.448		
· 18	113.63		95.23		91.560		
19	G EN 40/4		105.06	<u> </u>	104.389		

TABLE 3

DESCRIPTION ONLY

SUMMARY OF COORDINATE RESPONSES

(all values rms)

WITH SHIELD WITHOUT SHIELD Acceleration - g's Acceleration - g's Displacement - inches Displacement - inches Ÿ ż Ÿ. Ÿ ż <u>x</u> ÿ Y Grid Point Z X_ Z 1.403 1.407 2000 7.91 57.6 59.8 .086 .854 .866 6.98 88. 88. .076 2050 7.47 10.5 10.5 .082 .167 .165 6.6 17.1 17.1 .073 .279 .281 3020 7.40 4.64 4.78 .081 .054 .054 6.2 6.5 6.6 .072 .067 .070 3050 7.4 4.7 4.5 .081 .049 .051 6.5 5.63 6.1 .072 .055 .058 4030 7.4 4.6 4.5 .081 .059 .058 6.3 4.2 4.2 .070 .048 .048 5010 7.4 5.0 4.9 .081 .065 .064 6.3 4.22 4.1 .049 .049 **.**070 6010 8.6 11.1 11.1 .092 .144 6.2 7.0 .144 6.4 .069 .069 .066 6040 24.3 24.3 9.6 .101 .311 .312 6.97 15.4 -13.3 .076 .132 .119 6061 10.8 29.1 29.0 .113 .372 .372 8. 19.4 16.5 .085 .163 .144 6070 10.4 31.6 31.4 .109 .403 .402 7.7 21.2 17.9 .082 .155 .177 6080 10.4 .111 8.5 .086 .109 6130 10.3 8.7 .086 7030 10.43 32.8 32.6 .109 .418 .416 7.7 22.3 18.7 .082 .185 .162 8060 11.7 39.2 38. .128 :497 .484 8.43 29.2 22.7 .087 .236 . 193 10.44 8300 .110 8.81 .087 8400 10.5 .112 8.6 .087

TABLE 4

EOS (MINI-TANK CONFIGURATION)

SUMMARY OF COORDINATE RESPONSES

			WITH	SHIELD		······································		WITHOUT SHIELD					
	Acce	leration -	g's	Displa	cement -	inches		Acce	leration -	g's	Diepla	cement -	inches
Grid Point	<u> </u>	Ÿ	<u> </u>	<u> x</u>	<u> Y</u>	<u>z</u>	•	<u> </u>	<u>Ÿ</u>	ż	<u> x</u>	<u> Y</u>	
2000	8.75	32.6	35.7	.096	. 393	.48		5.3	31.6	34.	.065	.475	.521
2050	8.3	4.01	5.54	.092	.066	.094		5.03	5.58	6.36	.062	.096	.109
3020	8.23	5.43	5.73	.091	.059	.062		4.99	3.78	3.73	.061	.047	.049
3050	8.21	5.51	5.73	.091	.060	.061		4.97	3.73	3.67	.061	.045	.046
40 30	8.22	4.26	4.46	.091	.053	.054		4.85	2.83	2.87	.060	.036	.036
5010	8.21	4.12	4.34	.091	.054	.054		4.84	2.74	4.76	.060	.036	.034
6010	9.25	5.13	5.34	.101	.076	.067	•	4.69	3.3	2.72	.058	.043	.034
6040	9.93	10.36	9.17	.108	145	.105		5.03	6.1	3.1	.062	.071	.037
6061	10.89	12.44	10.42	.117	.171	.117		5.49	7.52	3.3	.067	.086	.039
60 70 [°]	10.42	13.56	10.94	.113	.185	.121		5.3	8.27	3.31	.065	.094	.039
6080	10.38	-	-	.113	.=	-		5.35	-	-	.065		-
6130	10.40	-	-	.113	-	- ,		5.34	-	-	.065	· -	· •
70 30	10.21	14.18	11.04	.110	.193	.122	٠	5.24	8.83	3.30	.064	.10	.039
8060	8.89	16.22	8.29	.099	.217	.090		4.95	10.94	2.35	.061	.12	.027
8300	10.32	-	-	.112	-	-		5.3	-	-	.064	-	
8400	10.27	-	-	.112		-		5.33	-	-	.064	-	_

TABLE 5

NSO

SUMMARY OF 30 COORDINATE RESPONSES 0 - 100 Hz

			WITH	SHIELD		·		WITHOUT SHIELD					
	Acce	leration -	g's	Displ	acement -	inches	Acce	Acceleration - g's			Displacement - inches		
Grid Point	<u> </u>	<u>Ÿ</u>	<u> </u>	. <u>x</u>	<u> </u>	<u>z</u>	 <u> </u>	Ÿ	ž	x	Y		
2000	2.13	30.2	35.7	.082	.204	.221	1.66	25.1	46.6	.083	.192		
2050	1.54	1.54	1.54	.079	.079	.079	1.54	1.54	1.54	.079	.079	.079	
3020	1.50	1.06	1.36	.08	.072	.073	1.53	1.65	1.87	.0786	.0728	.0737	
3050	1.49	0.84	1.03	.079	.073	.074	1.52	0.96	1.26	.0784	.0738	.0737	
4030	1.79	1.41	2.2	.076	.107	.11	1.44	8.05	7.42	.0737	.1063	.1092	
5010	1.85	1.65	2.58	.075	.113	.117	1.43	8.96	8.56	.0734	.1125	.1158	
6010	5.9	2.04	2.8	.069	.125	.128	1.27	8.42	8.15	.0684	.1237	.1266	
6040	8.87	2.46	2.22	.081	.133	.134	1.48	3.86	3.48	.0852	.1311	.1322	
6061	2.17	2.17	2.17 ·	.134	.134	.134	2.21	2.21	2.21	1324	.1324	.1324	
6070	2.21	2.79	2.67	.109	.135	.133	 1.90	2.94	2.65	.1108	.1338	.1311	
6080	.4.04	-	-	.099		-	4.76	_	• · · · · · · · · · · · · · · · · · · ·	.104	-	-	
6130	4.24		-	.096	-	-	2.61	-		.099	-	<u>-</u> ,	
70 30	2.17	3.51	3.15	.1047	.1337	.131	1.96	3.77	3.14	.1066	.1322	.1290	
8060	3.89	5.72	6.02	.074	.1312	.089	5.1	6.22	6.43	.0773	.1268	.0872	
8300	4.28	-	· -	.098	-	-	4.19	<u>.</u> .	_	.1004	-	.00/2	
8400	4.09	-	-	.100	· - ·	-	4.93	-	_	.1046	_	_	

TABLE 6

EOS (ENGINE ONLY)

SUMMARY OF THRUST TRAIN LOADS

	•	WITH SHIELD						WITHOUT' SHIELD					
		(in-lb	× 10 ⁻⁶)	. (lbs x	10 ⁻³)	(1bs x 10 ⁻³)	(in-1b x 10 ⁻⁶)	(in-lb	× 10 ⁻⁶)	(lbs x	10 ⁻³)	(lbs x 10 ⁻³)	(in-lb x 10 ⁻⁶)
Grid P	Point	BM-1	BM-2	<u>s-1</u>	<u>s-2</u>	<u>Axial</u>	Torque	<u>BM-1</u>	BM-2	<u>s-1</u>	<u>s-2</u>	Axial	Torque
	(+)	1.62	1.68	22.9	23.7	3.71	.0	2.57	2.58	36.6	36.8	3.38	0
2050	(-)	1.60	1.65	. 20.53	21.15	6.89	.045	2.54	2.54	33.4	33.6	6.23	.037
	(+)	2.54	2.62	21.77	22.33	8.6	.045	4.07	4.08	35.7	35.9	7.74	.037
3020	(-)	2.54	2.62	22.08	22.6	9.84	.045	4.07	4.08	36.5	36 .6	8.84	.037
	(+)	2.95	3.04	22.08	22,6	9.84	.045	4.76	4.77	36.5	36.7	8.84	.037
3050	(-)	2.95	3.04	41.7	45.8	9.61	.045	4.77	4.78	48.	50.	24.5	.040
	(+)	4.68	5.31	43.4	47.3	3.2	.045	1.70	1.75	49.2	50.8	31.8	.040
4030	(-)	4.68	5.31	44.5	48.1	3.6	.045	1.70	1.75	49.7	51.4	33.7	.040
	(+)	4.86	5.53	44.5	48.1	3.6	.045	1.67	1.75	49.7	51.4	33.7	.040
5000	(-)	4.86	5.53	45.4	48.9	4.8	.045	1.67	1.75	50.3	51.8	35.2	.040
5010	(+)	5.07	5.76	45.4	48.9	4.8	.045	1.7	1.8	50.3	51.8	35.2	.040
3010	(-)	5.06	4.99	49.	52.6	10.7	1.23	1.69	1.4	51.6	53.9	40.8	.274
	(+)	5.56	5.54	49.	52.6	10.7	1.23	1.90	1.62	51.6	53.9	40.8	.274
6000	(-)	5.56	5.54	206.	207.	129.	1.22	1.90	1.62	71.	61.3	33.4	,272
	(+) .	3.18	3.16	206.	207.	129.	1.22	1.08	.908	71.	61.3	33.4	.272
6010	(-)	.53	.50	107.	107.	44.3	.37	1.08	.908	70.	60.5	32.7	.272
	(+)	. 75	. 79	107.	107.	44.3		.256	.208	70.	60.5	32.7	.272
6020	(-)	. 75	. 79	94.6	95.	38.	.37	.256	.208	63.	54.3	28.4	.272
	(+Y)	.025	.019	2.5	1.81	2.42	o .	.016	.013	1.60	1.31	1.66	. 0
	(-Y)	.023	.019	2.18	1.82	2.4	0	.012	.013	1.14	1.31	1.67	0
7939	(+2)	.014	.0095	2.66	1.85	2.6	0	.010	.007	1.98	1.34	1.53	. 0
	(-Z)	.014	.0095	2.62	1.85	2.6	·o	.009	.007	1.67	1.34	1.53	0

TABLE 7

EOS (MINI-TANK CONFIGURATION)

SUMMARY OF THRUST TRAIN LOADS

					WITH SH	ITELD		↑ WITHOUT SHIELD						
	_	(in-lb	× 10 ⁻⁶)	(1bs >	10 ⁻³)	(1bs x 10 ⁻³)	(in-1b x 10 ⁻⁶)	(in-lb	× 10 ⁻⁶)	(1be	x 10 ⁻³)	(lbs x 10 ⁻³)	(in-1b x 10 ⁻⁶)	
Grid F	Point	<u>BM-1</u>	BM-2	<u>s-1</u>	<u>s-2</u>	Axial	Torque	<u>BM-1</u>	BM-2	<u>s-1</u>	<u>s-2</u>	Axial	Torque	
	(+) .	1.85	12.12	26.03	30.04	3.83	0	2.27	2.48	32.4	35.6	2.55	0	
2050	(-)	1.83	2.08	23.13	27.26	7.13	.052	2.24	2.44	29.76	32.75	4.72	.035	
	(+)	2.88	3.33	24.37	29.05	8.91	.052	3.61	3.96	31.94	35.22	5.85	.035	
3020	(-)	2.88	3.33	24,58	29.63	10.21	052	3.61	3.96	32.75	36.18	6.67	.035	
	(+)	3.34	3.89	24.58	29.63	10.21	.052	4.23	4.64	32.75	36.18	6.67	.035	
3050	(-)	3.34	3.89	39.52	48.26	5.53	.055	4.24 .	4.65	42.82	44.73	20.97	.037	
	(+)	5.02	3.64	40.58	48.63	5.01	.055	2.06	.87	42.90	44.5	26.44	.037	
4030	(-)	5.02	3.64	41.56	49.53	7.11	.055	2.06	.87	43.34	-44.85	27.84	.037	
	(+)	5.19	3.78	41.56	49.53	7.11	.055	2.07	.647	43.34	44.85	27.84	.037	
5000	(-)	5.19	3.78	42.31	50.14	8.94	.055	2.07	.647	43.61	45.	29.	.037	
	(+)	5.37	3.94	42.31	50.14	8.94	.055	2.11	.429	43.61	45.	29.	.037	
5010	(-)	5.35	3.19	45.81	53.21	15.8	1.46	2.10	.56	44.51	46.	33.3	.108	
	(+)	5.80	3.60	45.81	53.21	15.8	1.46	2.29	248	44.51	46.	33.3	.108	
6000	(-)	5.80	3,60	208.94	142.24	124.79	1.46	2.29	.248	83.86	8.76	18.44	.104	
	(+)	3.40	2.01	208.94	142.24	124.79	1.46	1.31	.15	83.86	8.76	18.44	.104	
6010	(-)	.654	.295	115.02	54.99	32.96	.316	1.31	.15	83.08	8.46	17.89	.104	
400-	(+)	.73	.923	115.02	54.99	. 32.96	.316	.329	.066	83.08	8.46	17.89	.104	
6020	(-)	.73	.923	103.63	45.13	26.	.316	.329	.066	76.8	6.7	14.92	.104	
	(+Y)	.149	.067	14.5	6.54	7.17	. 0	.027	.03	2.56	2.91	11.19	O	
7030	(-Y)	.130	.067	12.71	6.54	6.77	,	.026	.03	2.48	2.91	10.84	. 0	
	(+Z)	.033	.033	6.53	6.46	13.30	0	.051	.015	10.24	2.88	2.4	0 -	
	(-2)	.048	.033	8.76	6.46	13.30	0	.064	.015	12.16	2.88	2.4	9	

TABLE 8 NSO SUMMARY OF 30 THRUST TRAIN LOADS 0 - 100 Hz

(all values rms)

WITH SHIELD WITHOUT SHIELD $(in-1b \times 10^{-6})$ $(1bs \times 10^{-3})$ $(in-1b \times 10^{-6})$ $(1bs \times 10^{-3})$ $(1bs \times 10^{-3})$ $(1bs \times 10^{-3})$ $(in-1b \times 10^{-6})$ $(in-1b \times 10^{-6})$ Crid Point BM-2 <u>s-2</u> Axial <u>S-2</u> Axial BM-1 <u>s-1</u> Torque BM-1 BM-2 S-1 Torque 4.5 .841 .81 5.2 5.9 0 .343 .535 3.35 3.76 5.85 0 2050 (-) . 78 .77 15.3 15. 8.4 .023 .507 .335 6.16 9.97 10.2 .539 .561 20.7 (+) .64 20.2 10.4 .023 .371 .410 12.52 7.54 12.62 .539 3020 (-) .57 .64 23. 22.2 11.9 .023 .371 8.08 13.67 .410 14.2 .539 (+) .83 .90 23. 22.2 11.9 .023 .462 .560 8.08 13.67 14.2 .539 3050 (-) .84 .91 15.2 13.6 143.6 .047 .457 .561 11.08 174.7 3.99 .634 153. .64 13.5 (+) .57 12.1 .047 .508 .470 5.91 3.86 182.9 .635 4030 (-) .57 .64 12.9 11.3 155.2 .047 .508 .470 4.48 5.4 184.3 .635 (+) .63 .67 12.9 11.3 155.2 .047 .478 184.3 .518 4.48 5.4 .635 5000 .63 .67 12.3 10.6 157.1 .047 .518 .478 3.88 7.09 185.3 .635 (+) .69 .71 12.3 10.6 157.1 .047 .519 .494 3.88 7.09 185.3 .635 5010 .70 .92 10.0 7.9 163.5 .72 .512 .771 7.96 14.90 187.9 .170 (+) .80 1.01 10.0 7.9 163.5 .72 .428 .602 7.96 14.90 187.9 .170 6000 (-) . 80 1.01 7.5 164. 9.6 .72 .428 .602 16.11 187.2 9.12 .170 .89 1.09 9.6 7.5 164. .72 .344 .441 9.12 16.11 187.2 .170 6010 .72 1.05 21. 35.5 192.2 .23 .344 10.08 .441 17.03 185.2 .170 (+) .72 1.05 21. 35.5 192.2 .23 .265 . 301 10.08 17.03 185.2 .170 6020 (-) .41 .50 22.6 37.6 187. .23 .265 .301 13.24 19.42 169.2 .170 (+Y) .11 .12 10.2 11.6 3.4 0 .085 .119 8.3 11.6 2.95 (-Y) .11 .12 10. 11.6 3.3 0 .090 .119 8.79 11.60 2.87 7030 (+Z) .07 .06 10.5 11.2 7.5 0 .041 .058 6.24 11.24 7.5 0 (-2).07 .06 10.4 11.2 7.5

.046

.058

7.13

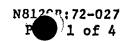
11.25

7.5

TABLE 9

ACTUATOR LOADS (LBS)

Case	Actuator No. 1	Actuator No. 2
1	1203	1209
2	1284	1388
5	1190	1058
6	256	346
7	687	1837
8	876	1615



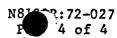
GRID POI	INT ISN*		D	EGREES OF	FREEDOM		·	DESCRIPTION
	•	<u> </u>	Y	Z	θ _x	<u>θ</u> χ	$\theta_{\mathbf{z}}$	
2000	1	1	2 .	3	4	5	6	Nozzle Extension
2010	2 .	7	8	9	10	11	12	11 11
2020	3	13	14	15	16	17	18	11 11
2030	9 4	19	. 20	21	22	23	24	11 11
2040	5	25	· 26	27	28	29	30	11 11
2050	6	31	32	33	34	35	36 .	11 11
3000	7	37	38	39	40	41	42	Nozzle
3010	8	43	44	45 •	46	47	48	
3020	9.	49	, 50	51	52	53	54	
3030	10	55	, 56	57	58	59	60	n
3040	11	61	62	63	64	65	66	H .
3050	12	67	68	69	70	71	72	н
3051	1 13	73	74	75	76	· 77	78	EOS Support Frame, Aft
3052	2 14	79	80	81	82	83	. 84	11 11 11
3053	3 15	85	86	87	88	89	90	11 11 11 11
3054	4 16	91	92	93	94	95	96	11 11 11 11
3055	5 17	97	98	99	100	101	102	11 11 11
3056	. 18	103	104	105	106	107	108	17 17 11 17
4000	19	109	110	111	112	113	114	Pressure Vessel
4001	1 20	115	116	117	118	119	120	Nuclear Subsystem
4002	2 21	121	122	123	124	125	126	11 11
4003	3 22	127	128	129	130	131	132	. H
4010	23	133	134	135	136	137	138	Pressure Vessel
4020	24	139	140	141	142	143	144	n n
4030	25	145	146	147	148	149	150	ti ti

GRID POINT	ISN*	DEGREES OF FREEDOM				DESCRIPTION		
		. <u>х</u>	Y		9 χ	<u> </u>	$\frac{\theta_{\mathbf{z}}}{\mathbf{z}}$	
5000	26	151	152	153	154	155	156	Pressure Vessel Fwd Closure
5010	27	157	158	159	160	161	162	11 11 11 11
6000	28	163	164	165	166	167	168	Lower Thrust Structure
6001	29	169	170	171	172	173	174	EOS Support Frame, Fwd
6002	30	175	176	177	178	179	180	0 0 0
6003	31	181	182	183	184	185	186	11 11 11 11
6004	32	187	188	189	. 190	191	192	11 . 11 11 11
6005	33	193	194	195 .	196	197	198	11 11 11 11
6006	34	199	, 200	201	202	203	204	11 11 11 11
6010	35	205	206	207	208	209	210	Lower Thrust Structure
6020	36	211	212	213	214	215	216	ii ii ii
6030	37	217	218	219	220	221	222	11 11 11
6040	. 38	223	224	225	226	227	228	11 11 11
6050	39	229	230	231	232	233	234	11 11 11
6060	40	235	236	237	238	239	240	11 11 11
6070	41	241	242	243	244	245	246	11 11 11
. 6071	42	247	248	249	250	251	252	
6072	43	253	254	255	256	257	258	11 11 11
6080	. 44	259	260	261	262	263	264	Actuator Aft Attach Point
6130	45	265	266	267	268	269	270	11 11 11 11
7000	46	271	272	. 273	274	275	276	Gimb al
7010	47	277	278	279	280	281	282	H .
7020	48	283	284	285	286	287	288	11
7030	49	289	290	291	292	. 293	294	H .
7040	50	295	296	297	298	299	300	11

GRID POINT	ISN*		מ	EGREES OF	FREEDOM			,	DE	SCRIPTION	
•		x	<u>Y</u>	Z	θ _{x}	<u> </u>	θ_z				
8000	51	301	302	303	304	305	306	Upper	Thrust	Structure	
8001	52	307	308	309	310	311	312	11	***	**	
8002	53	313	314	315	316	317	318	***	. 11	11	
8005	54	319	320	321	322	323	324	**	- 11	**	•
8010	55	325	326	327	328	329	330	. 44	**	•	
8020	56	331	332	333	334	335	336	**	11.		
8021	57	337	3 38	339	. 340	341	342	***	11	11	
8022	58	343	344	345 .	346	347	348	**	**	**	
. 8025	59	349	350	351	352	353	354	. "	11	11	
8030	60	355	356	357	358	359	360	*1	**	11	
8040	61	361	362	363	364	365	366	11	***		
8050	62	367	368	369	370	371	372	. 11	11	"	
8060	63	373	374	375	376	377	. 378	***	**	. 11	
807 0	64	379	380	381	382	383	384	. **	**	•	
8080	65	385	386	387	388	389	390		**	11	· •
8090	66	391	392	393	394	395	396	11	**	* 11	
8100	67	397	398	399	400	401	402	11	**	11	
8110	68	403	404	405	406	407	408	**	**	11	·
8120	69	409	410	411	412	413	414	11	**	11	
8130	70	415	416 ·	417	418	419	420	11	**	11	
8140	71	421	422	423	424	425	426		* ***	11	
8150	72	427	428	429	430	431	432	**	**	11	
8160	73	433	434	435	436	437	438		11	•••	
8170	74	439	440	441	442	443	444	. #	*1	11	
8180	75	445	446	447	448	449	450	11	11	**	



TAB 10 (Cont.)



GRID POINT	ISN*		r	EGREES OF	FREEDOM			DESCRIPTION
		x	Y	<u>z</u>	e _x	<u> </u>	$\frac{\theta_{\mathbf{z}}}{}$	
8190	76	451	452	453	454	455	456	Upper Thrust Structure
8200	77	457	458	459	460	461	462	11 11
8210	78	463	464	465	466	467	468	H H H
8300	79	469	470	471	472	473	474	Actuator Fwd Attach Point
8400	80	475	476	477	478	479	480	11 11 11
99 9000	81	481	482	483	484	485	486	Used For Plot Orientation Only
999001	82	487	488	489	490	491	492	11 11 11 11 11
99 900 2	83	493	494	495	496	497	498	H H H - H H
. 999003	84	499	z 500	501	502	503	504	H H H H H H
999004	85	505	506	507	508	509	510	11 11 II II II

TABLE 11

MINI-TANK MODAL DATA

<u>n</u>	f _n ~ Hz	M _n	$\frac{K_n}{(x \ 10^{-6})}$
1	0	2.927	0
2	0	2.927	0
3	0	0.664	0
4	155.5	1.311	1.251
5	268.1	0.444	1.262
6	305.9	0.2018	0.7457
7	328.	0.1584	0.6729
8	339.3	0.1940	0.8818
9	350.6	0.2043	0.9914

TABLE 12

ENGINE ASSEMBLY SUPPORT STIFFNESS

Grid Point	K	K _y	Kz	θ x
	(1b/inch x 10 ⁻⁶)			$(in-lb/rad \times 10^{-6})$
3050	3.5	3.5	3.5	40.
6000	3.5	3.5	3.5	40.

TYPICAL ACCELERATION RESPONSE

					•
	f Hz				a g's
	22.5				1.96
	23.0				1.99
	23.5				2.02
*	24.062				2.06
*	24.121				2.06
	24.50				2.08
	25.0				2.12
	33.5		•		3.13
	34.0				3.24
	34.5			. •	3.35
	35.0	•			3.47
*	35.409			•	3.57
*	35.740				3.65
	36.0			*	3.72
	36.5	•			3.88
	37.0				4.06
	37.5				4.26
					•
	Σ =				50.6
	RSS =				12.7
	NARROW	BAND =			6.98

^{*} Engine Natural Frequencies

No120R: /2-02/

TABLE 14

ENGINE NATURAL FREQUENCIES

		•
n	$\frac{f_n - Hz}{n}$	Identification
1	23.908	1st nozzle bending + Y, + Z
2	23.968	lst nozzle bending + Y, - Z
3	27.984	1st engine bending X - Z plane
4	28.093	1st engine bending X - Y plane
5	33.644	UTS/Actuator
6	40.02	1st axial EAS
7	40.51	2nd nozzle bending X - Z plane
8	40.87	2nd nozzle bending X - Y plane
9	58.49	UTS
10	58.85	UTS/LTS bending
11	60.05	1st NSS
12	61.13	2nd engine bending X - Y plane
13	72.47	1st engine axial

ENGINE NATURAL FREQUENCIES

<u>n</u>	f _n - Hz	Identification
1	24.062	lst nozzle bending + Y, + Z
2	24.121	1st nozzle bending + Y, - Z
3	35.409	1st engine bending X - Z plane
4	35.74	1st engine bending X - Y plane
5	40.74	2nd engine bending X - Z plane
6	41.13	2nd engine bending X - Y plane
7	46.23	1st axial EAS
8	49.96	UTS/Actuator
9	62.90	1st NSS
10	72.48	2nd NSS

ENGINE NATURAL FREQUENCIES

n	f _n - Hz	Identification
1	23.944	lst nozzle bending X - Y plane
2	24.053	1st nozzle bending X - Z plane
3	27.494	1st engine bending X - Y plane
4	31.428	1st engine bending X - Z plane + UTS
5	33. 956	1st engine bending + mini-tank
6	36.942	2nd nozzle bending X - Z plane
7	40.47	mini-tank + local UTS
8	40.91	2nd nozzle bending X - Y plane
9	41.80	1st EAS axial
10	56.98	UTS + mini-tank
11	58.98	EAS X - Z plane + engine bending
12	61.02	1st NSS
13	61.4	EAS X - Y plane + engine bending
14	63. 15	UTS/mini-tank
15	72.96	1st EAS axial

ENGINE NATURAL FREQUENCIES

		•
n	$\frac{f_n - Hz}{}$	Identification
1	24.074	1st nozzle bending + Y, + Z
2	24.141	1st nozzle bending + Y, - Z
3	31.28	mini-tank
4	39.26	1st engine bending X - Z plane
5	40.28	lst engine bending X - Y plane
6	41.95	mini-tank + nozzle, X - Y plane
7	42.25	mini-tank + nozzle, X - Z plane
8	47.54	1st EAS axial
9	54.38	UTS/mini-tank
10	59.09	mini-tank
11	64.78	1st NSS + mini-tank
12	73.11	2nd NSS

TABLE 18

ENGINE NATURAL FREQUENCIES

n	$\frac{f_n - Hz}{}$	Identification
1	2.074	1st system cantilevered mode, X - Y plane
2	2.322	1st " " , X - Z plane
3	2.858	mini-tank + engine bending X - Y plane
4	6.897	2nd system cantilevered mode, X - Y plane
5	8.457	1st system axial
6	9.561	mini-tank + engine bending X - Z plane
7	27.076	lst nozzle bending X - Y plane
8	27.422	1st nozzle bending X - Z plane
9	33.507	mini-tank + nozzle
10	34.877	2nd engine bending X - Y plane
11	43.085	mini-tank + 2nd engine bending + Y, + Z
12	43.482	mini-tank + 2nd engine bending + Y, - Z
13	57.358	mini-tank local
14	59.147	NSS + LTS axial
15	63.145	no dominant characteristic
16	69.430	
17	84.448	n n n
18	91.560	n n
19	93.373	11 11 11
20	104.4	n n

N8120R:72-027

TABLE 19

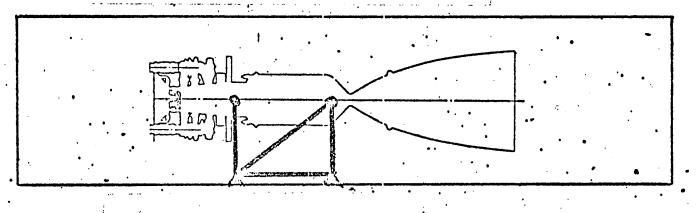
ENGINE NATURAL FREQUENCIES

n	$\frac{f_n - Hz}{}$	Identification
1	2.162	1st system cantilevered mode X - Y plane
2	2.369	" " X - Z "
3	. 3.966	mini-tank + engine bending X - Y plane
4	9.291	2nd system cantilevered mode X - Y plane
5	9.931	1st system axial
6	14.144	2nd system cantilevered mode X - Z plane
7	27.835	1st nozzle bending X - Y plane
8	28.592	lst " X - Z "
9	36.321	mini-tank + engine bending X - Y plane
10	53.025	2nd engine bending + Y, - Z
11	56.869	mini-tank
12	63.558	LTS axial + NSS
13	69.558	1st LTS bending + axial
14	71.857	2nd " + "
15	77.438	2nd engine bending X - Y plane
16	101.3	no dominant characteristic

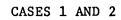
APPENDIX A

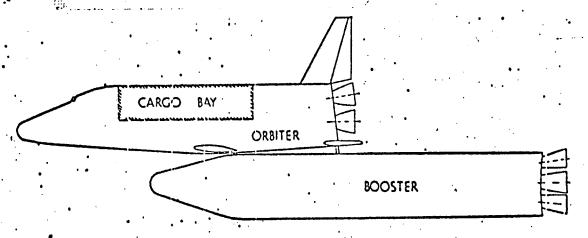
CASE 1

1-0

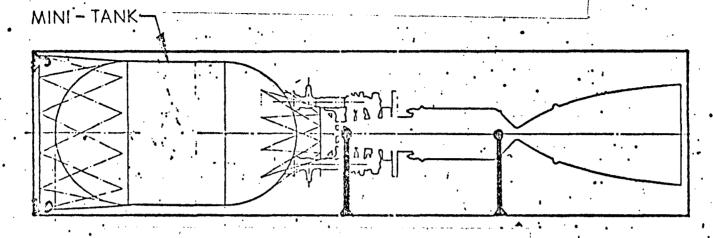


ENGINE ONLY CONFIGURATION



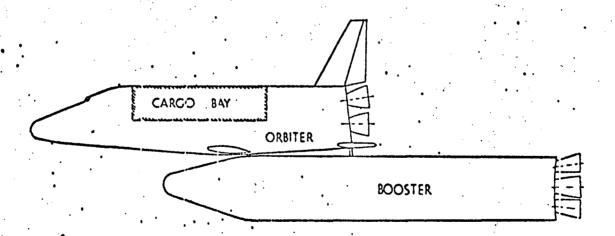


EOS LAUNCH VEHICLE

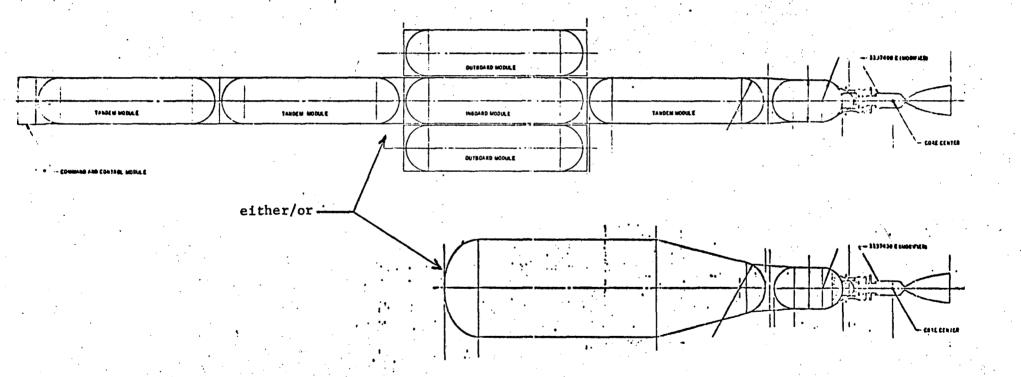


MINI-TANK CONFIGURATION

CASES 5 AND 6



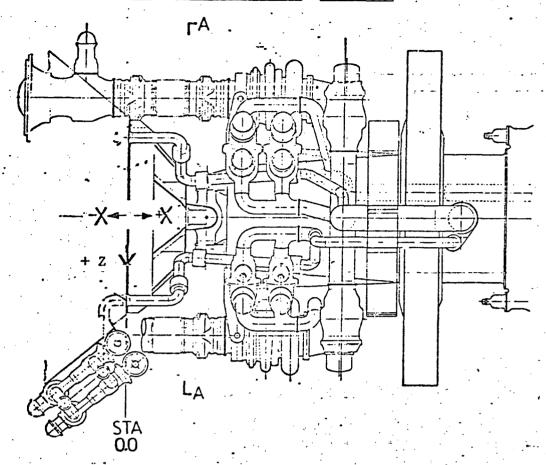
EOS . .



NUCLEAR SPACE OPERATION MINI-TANK

CASES 7 AND 8

ENGINE COORDINATE SYSTEM

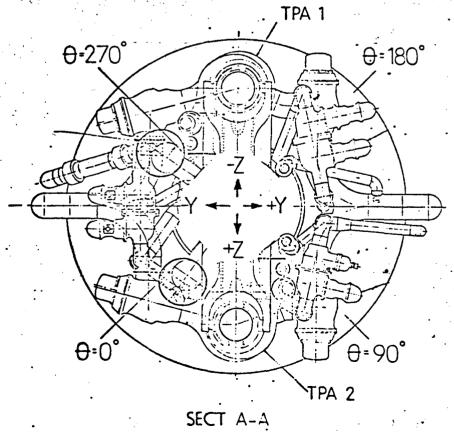


RHS

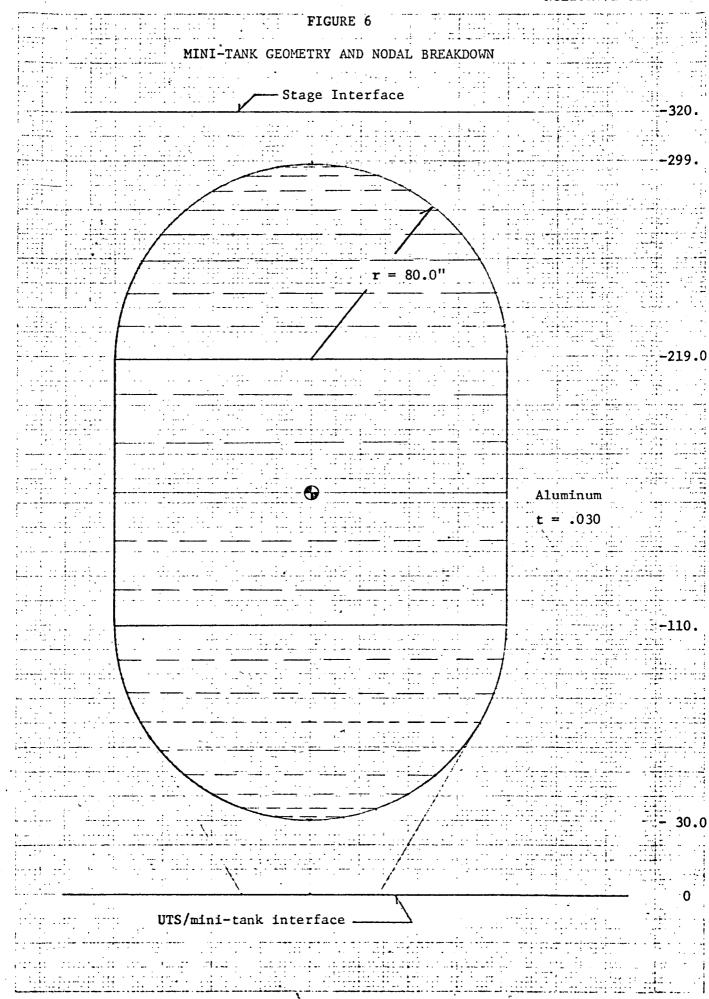
+X - aft (roll axis)

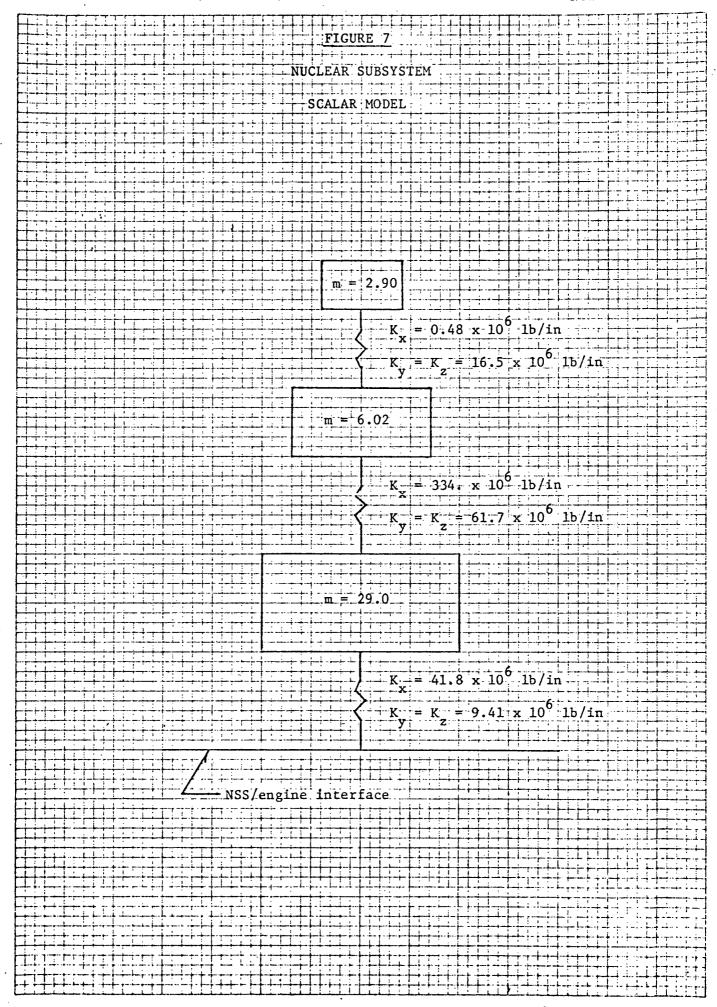
+Y - st'bd. (pitch axis)

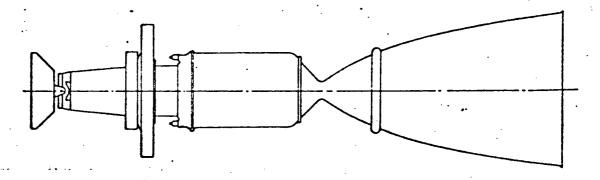
+Z - up (yaw axis)



1. 3 m







f = 23.908 Hz

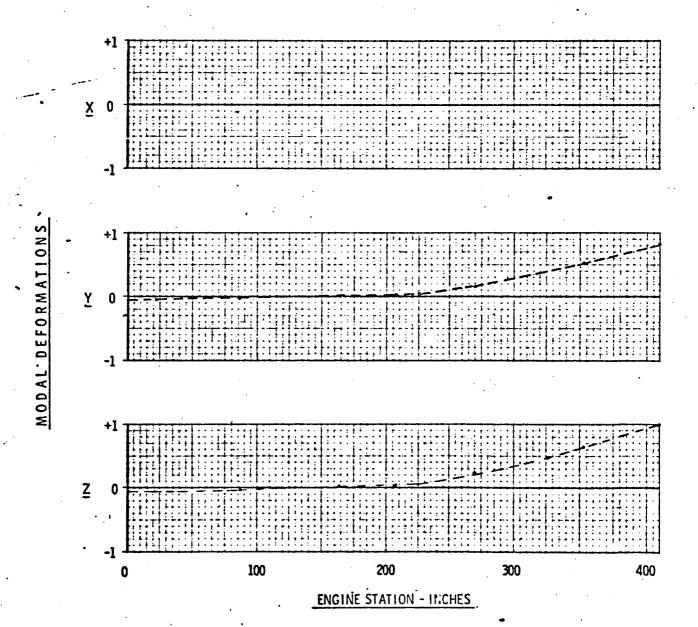
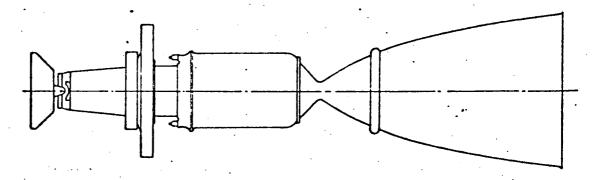
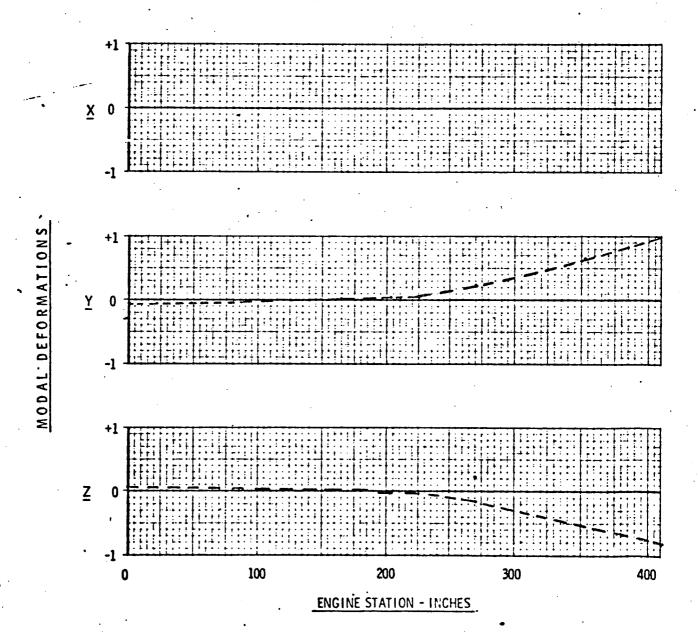
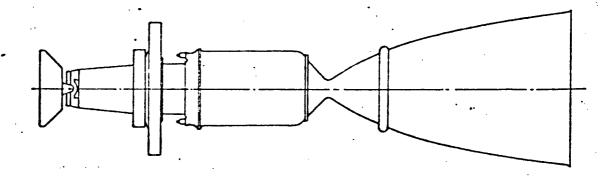


FIGURE 8-2

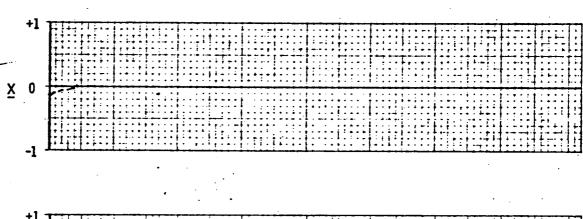


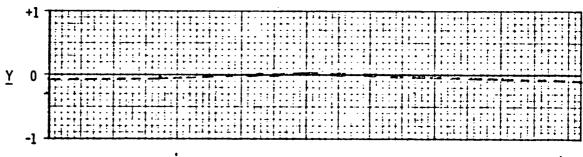
f = 23.968 Hz

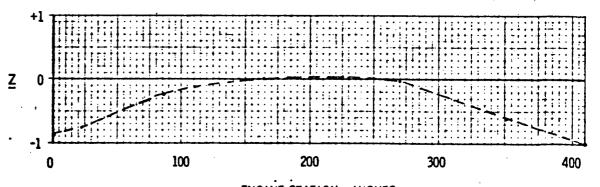




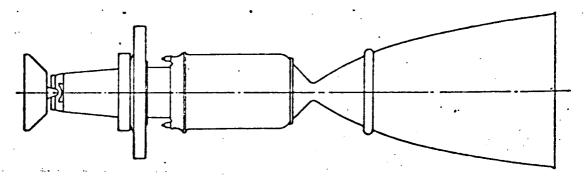
f = 27.984 Hz



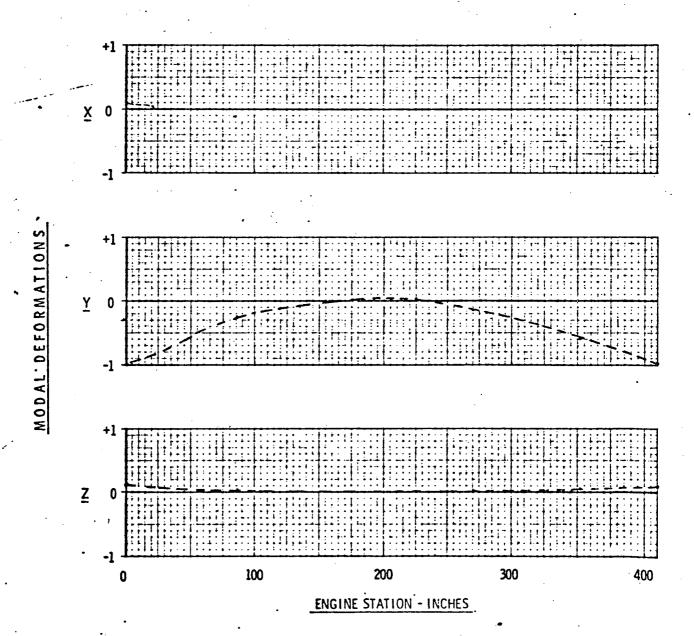


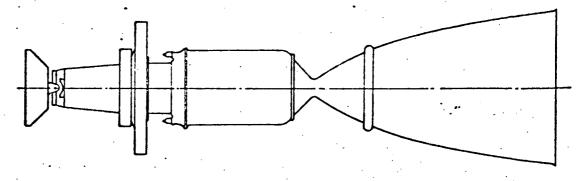


ENGINE STATION - INCHES



f = 28.093 Hz





f = 33.644 Hz

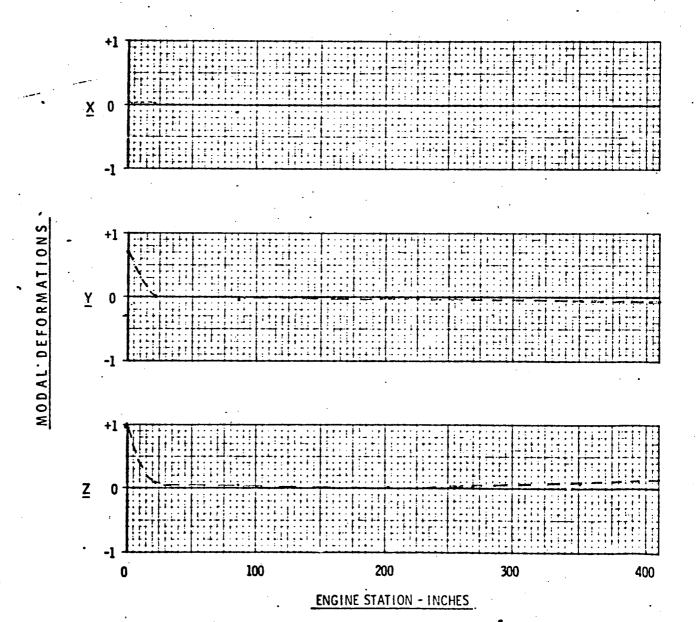
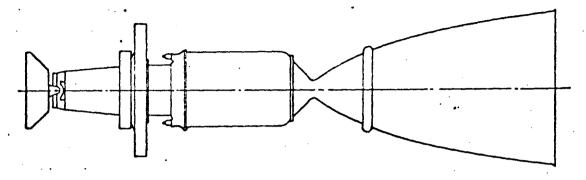
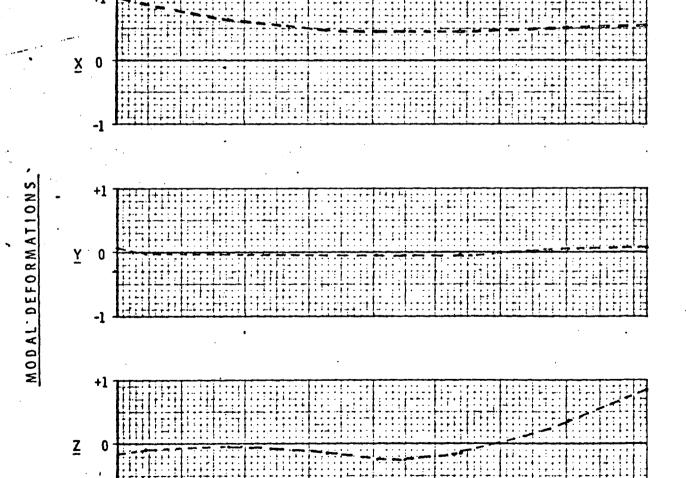


FIGURE 8-6



f = 40.02 Hz



ENGINE STATION - INCHES

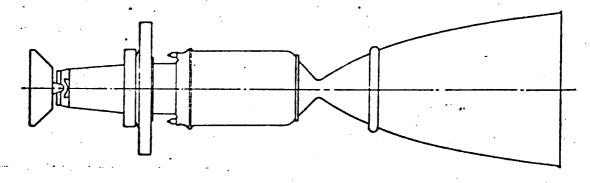
300

400

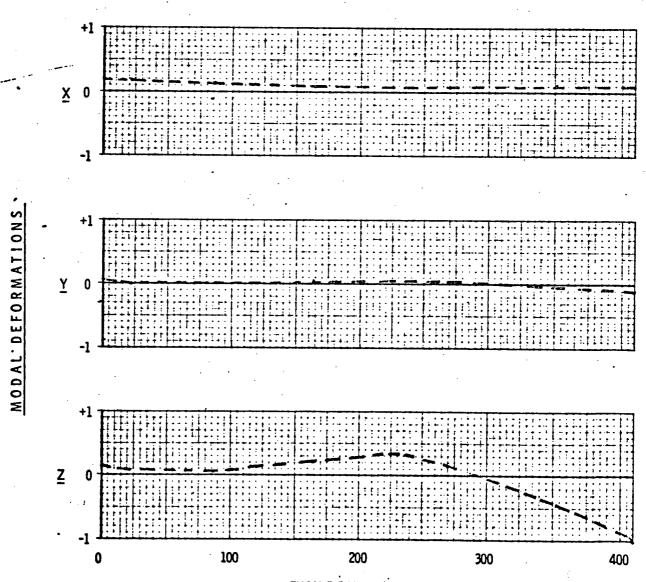
200

100

FIGURE 8-7

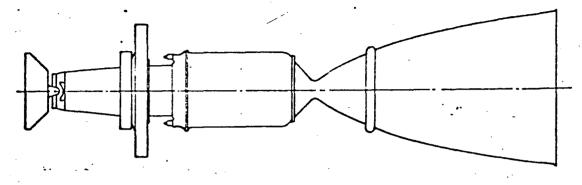


f = 40.51 Hz



ENGINE STATION - INCHES

FIGURE 8-8



f = 40.87 Hz

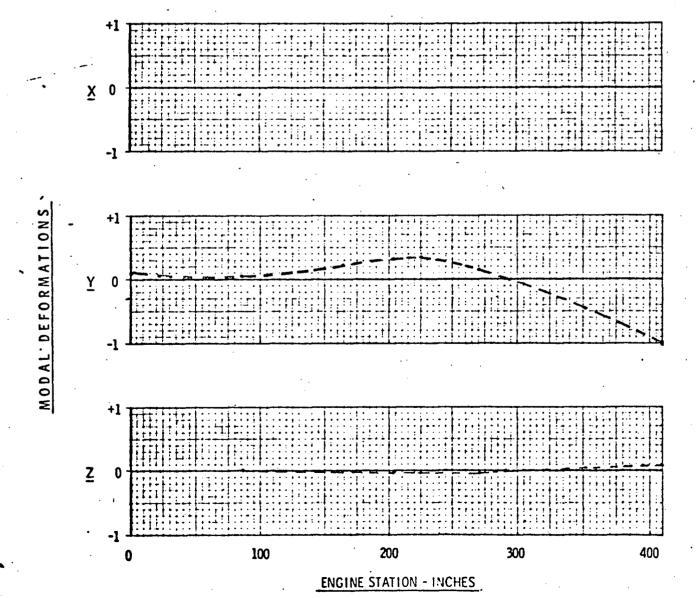
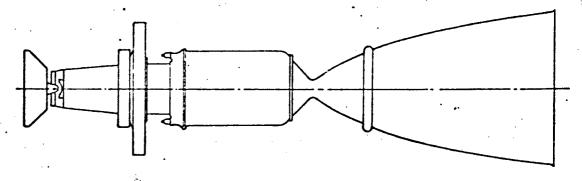
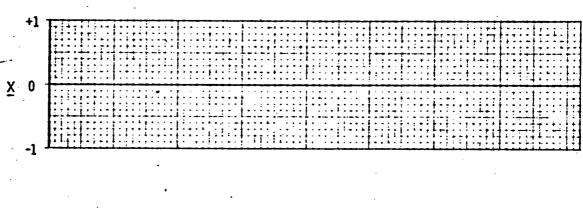
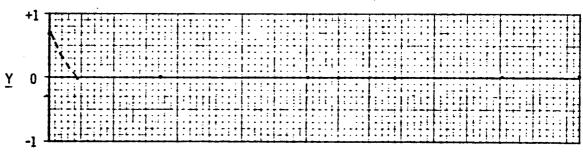


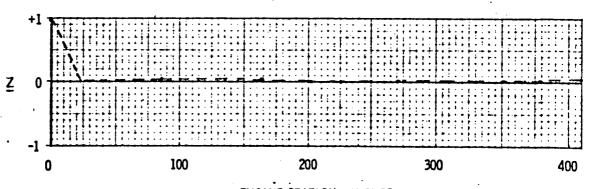
FIGURE 8-9



f = 58.49 Hz

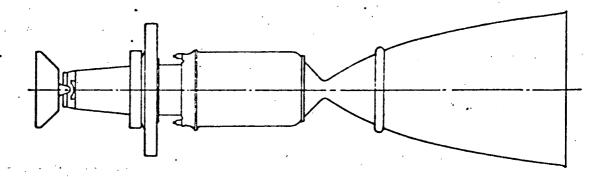




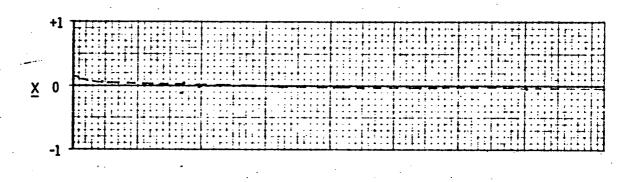


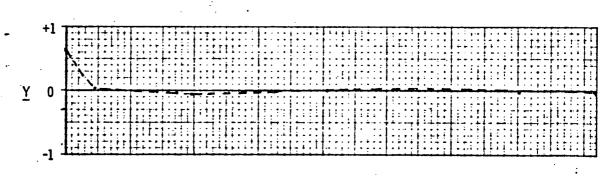
ENGINE STATION - INCHES

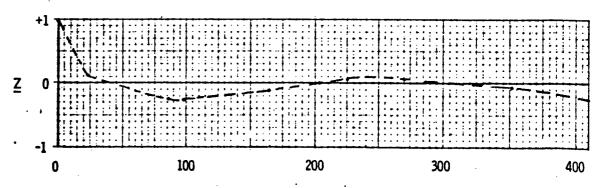
FIGURE 8-10



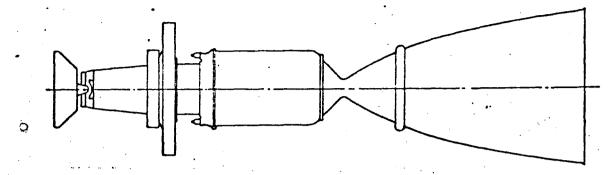
f = 58.85 Hz



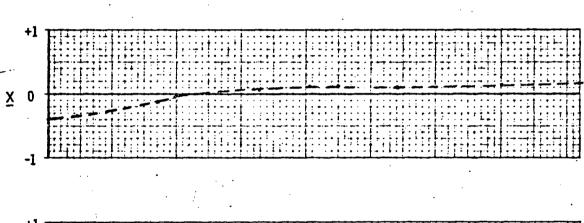


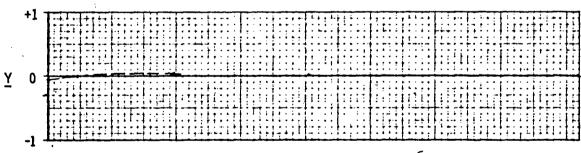


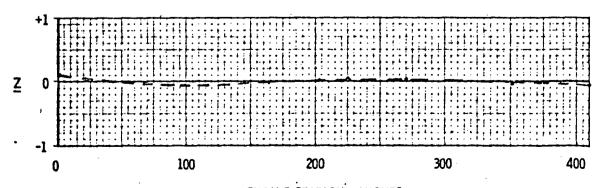
ENGINE STATION - INCHES



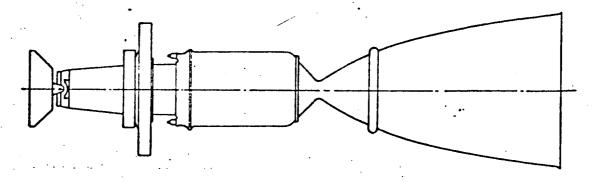
f = 60.05 Hz



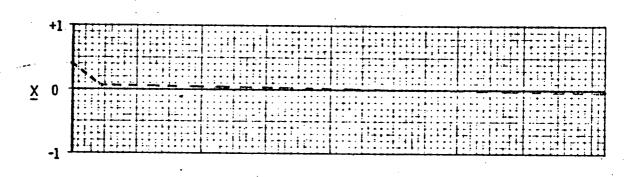


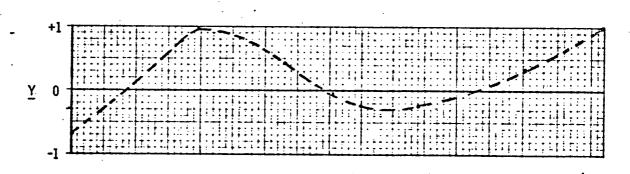


ENGINE STATION - INCHES

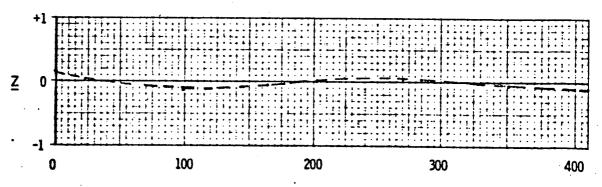


f = 61.13 Hz



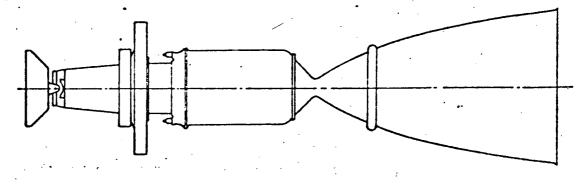


MODAL DEFORMATIONS

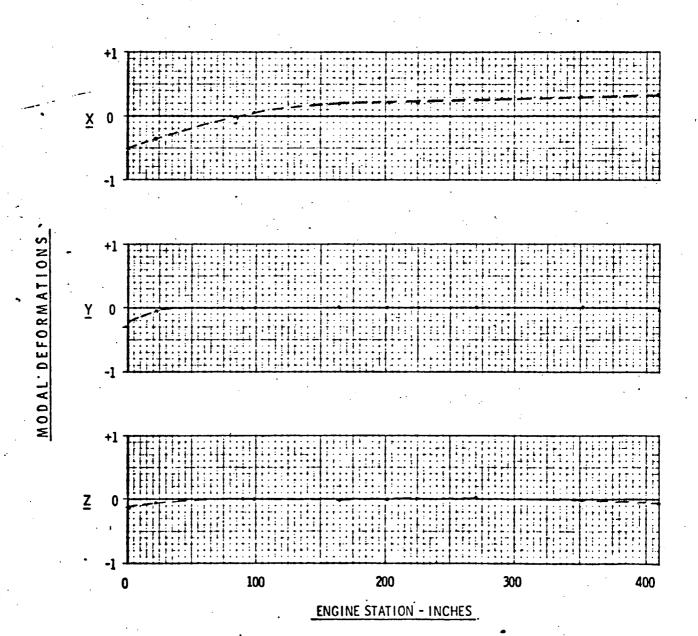


ENGINE STATION - INCHES

FIGURE 8-13



f = 72.47 Hz



N8120R: 72-027

APPENDIX A

LISTINGS OF BASIC BULK DATA DECKS

Page 1

APPENDIX A

CASE 5

Page 2

D ELT EOS/CASES.1.720114, 42458

000001	BAROR .		1000-4	0 1000.0 0.	n 1		•	
000002	5*********	******	******	******		*****		
000003	\$							
000004	5	COORD	INATE SYSTEM DEF	INITIONS				•
000005	\$					· · · · · · · · · · · · · · · · · · ·		
000006	CORD2C 2	256 • 1	•0 •0	3000	• 0	BC		
000007	+BC 300.0	-50.0 0.0		•		100	•	
800000	CORD2C 8000	0.0	0.0 0.0	1000.0 0.	0 0.0	CYL		
000009	+CYL 1000.0	•			•	•		
000010	S+********	******	******	: *******	******	*****	•	
000011	\$							
000012	\$ SUPOR	T CARD FOR RIGI	D BODY MODES			•		•
000013	\$.						•	
0000147	5*********	********	*****	*****	*****	******	1	
000015	\$							
000016	ъ	EIGEN	VALUE EXTRACTION	•				* * * * * * * * * * * * * * * * * * * *
000017	\$				····			
000018	EIGR 25	GIV '		25	1.E-6	GIV25		
000019	+GIV25 MAX					•		
000020	5*********	*******	******	******	*****	*****	······································	
000021	\$	f		•				
000022	5	SINGL	E-POINT CONSTRAIN	NT SETS		,		
100023	<u> </u>		X					
(00024	SPC1 10	123456 8700					•	
000025	5********	******	******	*****	*****	*****		
000026	\$							
000027	\$		MULTI-POINT CON	STRAINTS		1. A.		•
980000	\$			•				
000029	MPCADD 10	6062 7000	7010 8300	8500 87	00			***************************************
000030	5 .	•	•					
000031		C TPA #2 TO TPA						
000032	MPC 6062	6062 1	1.0 6061	1 -1	-	•	\.\.\.\.\.\.\.\.\.\.\.\.\.\.\.\.\.\.\.	
000033	MPC 6062	6062 2	1.0 6061	2 -1				
000034	MPC 6062	6062 ° 3	1.0 6061	3 -1			•	•
000035	MPC 7000	7000-1	1.0 6070	-1	• 0	7000X		
000036	+7000X	6070 5	10.25				ϵt	
000037	MPC 7000	7000 2	1.0 6070	2 -1	•	7000Y		
000038	+7000Y	6070 4	-10.25 6070	6 , 6.				
000039	MPC 7000	7000 3	1.0 6070	3 -1	• 0	7000Z		
000040	+70002	6070 5	-6.0					• •
000041	MPC 7000	7000 4	1.0 6070	4 -1				
000042	MPC 7000	7000 5	1.0 6070	5 -1			•	•
000043	MPC 7000	7000 6	1.0 6070		•0		·	
000044	MPC 7010	7010 .1	1.0 25	1 -1	• 0	7010X		
000045 000046	+7010X	6070 5	-10.25		0	-010 V		•
	MPC, 7010	7010 2	1.0 6070	···	• 0	7010Y	أوالماء والمعاورة والمجارة والمعاورة والمعاورة	
000047	+7010Y	6070 4	10.25 6070	0 0,		-0107		
000048 000049	MPC 7010 +7010Z	7010 . 3	1.0 6070 -6.0	3 -1	• U :	7010Z		•
000050	MPC 7010	6070 5 7010 4	-0.U	<u> </u>				
000051	MPC 7010		1.0 6070 1.0 6070		• 0	•		
000052	MPC 7010	7010 5 7010 6	1.0 6070 1.0 6070	5 - 1 6 - 1				•
000053	MPC8300	-6080	1.0 6050		•0	6080A	· · · · · · · · · · · · · · · · · · ·	
000054	+6080A	6050 5			4.34	POON		
000055	MPC 6300	6130 1	1.0 6050	1 -1		6130A		
000056	+6130A	6050 5	14.34 6050		0.48	0130K		
	~~		21131 0000	•	.5 - 40	•	•	

	VRONAY	,428218	•1•100 F	ASTRAND	FILES MA	NIPULATI	010	•	DATE 03	APR 72 PA	GE 4				
000057	MPC	8300	8300	1	1.0	8170		-1.0	٠.						
000058	MPC	8300	8400	ī	1.0	8080	î	-1.0	•		V		•		
000059	S*****	*****	*****	*****	******	******	******	******	****	*****	£				
000050	\$.														
000061	5	•		OMITTE	ED COORDI	NATE SET	•								
000062	5														
000063	OMIT1	123456		3010	3030	3040	4025	8000	8001	6D0FA					
000064	+6DOFA	8002	8005	8010	8020	8021	8022	8160	8030	6D0FB			:		·.
000065	+6D0F8	8110	8130	8140	4010										
000066	OMIT1	456	2000	8170	2040	3000	8210	3020	8180.	3DOFA					•
CU0067	+300FA	8190	4000	8150	4020	8200_	4030	5000	6000	3D0FB					•
C00068	+300FB	6020	6030	6040	6070	7020	7030	7040	8040	3D0FC		• ;			
000069 .	+3DOFC	8050	8060	8070	8080	8090	81.00	8120				•			·
00070 00071	5*****	*****	******	******	*****	****	******	*****	*****	*****	t				
	· 3											•			•
000072 000073	\$ \$		•		PARAM CA	RDS								•	
		30500											<u> </u>		
000074 / 000075	PARAM	GROPNT	-												
000075	5****** 5	*****	******	*******	******	*****	*****	******	*****	******	:		<i>i</i>		
000077	- \$		CL ODAL	AVEC C	OR PLOT O	NT	<u> </u>	-				 	<u> </u>		
000077	5		GLODAL	AVES L	OK PLOT O	KIENIAII	ON						ĺ		
000079	GRID	1		430•				107456		•	•		;	•	
000080	GRID			730•	50.			123456			•			·	
000081	GRID	. <u>.</u> 3			30 •	E0.		123456		*				•	
000082	GRID	10		420•	•	50.		123456 123456					•	•	
000083	GRID	20		12.00	40.			123456				•			
000084	GRID	30			400	40.		123456		•					
000085	PLOTEL	9001	10	1 .		404		123430				,	٠,		•
600086	PLOTEL	9002	20	<u>_</u>										···-··	
000087	PLOTEL	9003	30	3				-				÷	• '		
850000	PLOTEL	9010	8120	8005		9011	8005	. 8025		- '		•	•		
000089	PLOTEL	9012	8025	8150		9013	8150	8140							
000390	PLOTEL	9014	8140	8130	, ·	9015	8130	8120		4.1.7					
000091	PLOTEL	9020	8200	8050		9021	8050	8040	(f -		٠.			•	
0.00.035	PLOTEL	9022	8040	0303	······································	9023	060	8110		,					
000093	PLOTEL	9024	8110	8160	•	9025	8160	8200		•		•	·	•	
000094	S*****	*****	*****	*****	*****	******	******	*****	*****	*****	:			•	
000095	\$.												,		
000096	\$	CON	CENT	RATE	D M A	SS I	TEMS			• •	,		٠.		•
000097	<u> </u>				by - a Tananahanan arin asar asar asar asar							· ·			
000098	5	0001			5								. ,		
000099	CONM2	9001	2050	2	0.15	28.82	17.6	-2.09	4	100					•
000100	CONM2	9002	5010		.037	3.36_	12.4	7.12	·	· ·	<u> </u>				
	CONN2	9003	5010		1.19	-2.82	•0	• 0		•					
000102 000103	CONM2	9004	6060	٠.	0.98	2.42	-26.1	• 0				•	•	•	
000104	CONM2	9005	6050			-1.5	26.5	14.5							
000104	CONM2	9006	6050	CT SUBSY	0.92	4.50	27.5	0.0				•	•		
000105	" 5		DESTRU	C1 50051	ISIEM	•	•					·			
000103	s		N0221 F		ENSION AT	エカイ はMENIT	,		· · · · · · · · · · · · · · · · · · ·			** ** ****	<u> </u>		
000108	CONM2	2051	2050		•0855	TACES CITE				NEA					•
000109	+NEA	72.	4 000.	36.	•0933		36.	*.	ŧ .,	, MCN	,-		*		
000110	s		CORF	UPPORT-						····			·····	<u> </u>	
000111	CONM2	3051	3050		0.668	-4.93	•			cs	1 .		•		
000112	+CS	328.		170•		. • /	170.			Ç.J		· .			
000113	s		FLANGE								 :				
000114	CONM2	3052	3050		1.08	2.07			· ·	FLANGE					•
000115															
000115	+FLANGE	594•		298•			298 •					•	•		

	VRONAY	,428218,	1.100 FA	STRAND F	ILES MAN	IPULATI	<u> </u>		ATE 03	APR 72	PAGE	5				
000117	CONM2	2052 .	2050		0.40					RIN	•	٠,	•			•
000118	+RING	335.	2000	168.	0040		168.	•		KTIA						•
000119	\$		TORUS			··										
000120-	CONM2	2053	2050		0.198	-3.11				TOR	JS	,	,			21
000121	+TORUS	181•		91.			91.			•				•	ė	
000122	Ĝ,			TO PV BO			,									
000123	CONM2	3057	3050		• 096	1.07		•		BOLT	rs	.				
000124	+BOLTS	51.15		_25.65	حييد د د د د د		25.65					. • • <i>•</i>		<u></u>		
000125	\$	5044	CONTROL			(18)										
000126 000127	CONM2 CONM2	5011 5012	5010 5010	8000	•0344	24.5	10.					` :				
000128	COMM2	5013	5010	8000 8000	•0344 •0344	24.5	30.		······································							
000129	CONM2	5015	5010	8000	.0344	24.5 24.5	50. 70.	·								
000130	CONM2	5015	5010	8000	•0344 •0344	24.50	90.		•				•			
000131	CONMS	5016	5010	_8000	0344	24.50	110.	·				····				
000132	CONME	5017	5010	8000	0344	24.50	130.		•		•.					
000133	CONM2	5018	5010	8000	0344	24.50	150.		•							
0001347	CONMS	5019	5010	8000	0344	24.50	170•		,		7		····			
000135	CONM2	50110	5010	8000	.0344	24.50	190.			. '	•	•			•	
000136	CONM2	50111	5010	8000	.0344	24.50	210.	•						į		
000137	CONM2	50112	5010	8000	•0344	24.50	230•									
000138	CONM2	50113	5010 .	18000	.0344	24.50	250•	•						1		
000139	CONMS	50114	5010	0008	•0344	24.50	270•							i		
000140	CON142	50115	5010	8000	.0344	24.50	290•					,				
060141	CONM2	50116	5010	8000	• 0344	24.50	310.			•						
000142	CONMS	50117	5010	0003	0344	24.50	330•	· .	· · · · · · · · · · · · · · · · · · ·				•		<u> </u>	
000143	CONWS	50118	5010	8000	0344	24.50	350.		100					•		
000144	·\$	(010	SHIELD		05.06	4										
000145	CONM2	6010 29743	6010	14957.	25.06	1.67				SHIE	LD			, 		
000147	\$	29143.	NDICE	14937.			14957.				* .	• • •				
000147	CONM2	6021	6020		1.55				• •		· . '	•			·	
000149	5			AC	TUATORS				·	·						
000150	CONM2	60801	6080	7.0	0.24	•						•	1.	٠		
000151	CONM2	61301	6130		0.24			•			•					
000152	CONM2	83001	8300	······································	0.24				······································					~~ —		
000153	CONMS	84001	8400		0.24	•				,						
900154	\$			´ ' SI	MPLE NSS	;			4				₹			•
000155	CONWS	4001	4001		29.											•
000156	CONM2	4002	4002		6.02								• .:	•		•
000157	COUMS	4003	4003		2.90											
000158	5****	*****	*******	******	*****	*****	******	*****	*****	****	****				•	
000159	5	COLEDAN			110771 5	EVENCES								•		•
000160	\$	COMPONE	ENT NO. 2	<u>. </u>	NOZZEE	EXTENSIO	·N	T			· · · · · · · · · · · · · · · · · · ·					
000161	CβΛR	2020	2020	2020	2000											,
000163	CBAR	2040	2040	2020	2020									•		
	CBAR-	2050	-2050	2050	-2040			·········	.			· · · · · · · · · · · · · · · · · · ·				
000165	GRID	2000		409.372												•
000166	GRID	2020		351 + 543					•							
000267	GRID	2040		296-865							·	7 7 7 9 6 9	1 11 - 1		·	
000168	GRID	2050		270 • 190						•	*	•	•	٠.		
000169	MAT1	100	1.7E6	0.70E6		1.355E-	4		•	•	1			•		
000170	PBAR	2020	100	40.865	55550	55550	111100.			·						·
000171	PBAR	2040	100	33.253	30250.	30250.	60500	.00445			•	. •				
000172	PUAR	2050	100	50.047	25400.	25400.	50800.	.00445		•		· · · · · · · ·				
000173	3****	****	*****	*****	******	*****	*****	k*****	*****	*****	****					
000174	\$ i	CONTRACT	-	•	NO == ' =		*				'					
000175	. \$	COMPONE	ENT NO. 3) 	NOZZLE			******		******						<u> </u>
060176	lb .						1					. 1				
							• ;								*	

	VRONAY	428218,	1.100 FAS	STRAND F	LES MAN	IPULATION			DATE 0	3 APR	72 P	AGE	6			-		1
000177	CBAR	3000	3000	3000	2050						•			•				. [
	CBAR	3010	3010	3010	3000				•					•			•	1
	CHAR	3020	3020	3020	3010									· · · · · · · ·				
000180	CBAR	3030	3030	3030	3020			, *										
000181	CBAR	3040	3040	3040	3030													·i
	CHAR	3050	3050		3040			·.										1
	GRID	3000		254 • 218	7												•	1
	GRID	3010		233.25			·						·					<u> </u>
	GRID	3020		225.90 220.491						•	•				-			
000186 000187	GRID GRID	3030 3040		213.236						:								į
000188	GRID	3050		206.93		· · · · · · · · · · · · · · · · · · ·												
	MAT1	347	29.356	11.4E6		7.394E-4	ı						•				•	. !
000190	PBAR	3000	347	11.5	3414.		6828•	•007	· :	5.		; ;•-					_	!
000191	PBAR	3010	347	32.3	4371.		8742.	•007						······································				
000192	PBAR	3020	347	16.3	567.	567•	1133.	.007										. !
000193	PBAR	3030	_3.47	13.7	333	_333•	666•	007										. !
000194 ,	PBAR	3040	347	25.2	2070•	2070.	4140.	•007					, .					
000195	PDAR	3050	347	82.2	16170.	16170.	32340.	•007	•									- 1
000196	5*****	****	****	****	*****	*******	****	*****	****	****	****	*			1	 -		-
000197	5	Mucl 540	CUDEVET	- 14 .	C.T.WO! =	MODEL							<i>.</i>		i		•	ĺ
000198 000199	\$ •	NOCLEAR	SUBSYSTE	- IAI	SIMPLE	MODEL				•								!
000200	CELAS2	40011	41.8E6	4001		3050	1											
000201	CELAS2	40012	9.41E6	4001	2	3050	2							,			Ź.,	i
060202	CELAS2	40013	9.41E6	4001	3	3050	3			. ,	•		1.	•	٠.			i
000203	CELAS2	40021	334 E6	4002	1	4001	1								,		· · ·	
	CELAS2	40022	61.7E6	4002	2	4001	2					,	•	•	٠,		٠	
000205	CELAS2	40023	61.7E6	4002	3	4001	3					٠.			<u>. '</u>		·	
000206	TCELAS2	40031	0.48E6	4003	1	4002	1											
000207	CELAS2	40032	16.5E6	4003	2	4002	2 '							•				. i
000208	CELAS2	40033	16.5E6	4003	3	4002	3		<u> </u>		<u></u>	<u> </u>	· · · · · · · · · · · · · · · · · · ·					
000209	GRID	4001		170.0				456										;
000210 000211	GRID GRID	4002 4003		129.0 124.0				456 456					. * `	,				:
000212	5*****		*****	124.0	****	***	*****	430	*****	*****	****	*						
000213	\$	4 1 1 4 1 1 1 1 1 1 1										•		•	. `	•	•	1
000214	5	COMPONE	NT NO. 4	•	PRESSUR	E VESSEL				•			•		٠.	,		1
000215	- \$								······									•
000216	CBAR	4000	4000	4000	3050	,								, ,				
000217	CBAR	4010	4000	4010	4000		~~~~~~~~~~		· · · · · · · · · · · · · · · · · · ·									İ
000218	CBAR	4020	4000	4020	4010				•									
000219	CBAR	4025	4000	4025	4020						,		•					
000220	CBAR GRID	_4030 _4000	4000	_4030 _185•517	_4025					·			 					
000221 000222	GRID.	4010		164.105					•									
000223	GRID	4020		142.692		•		•					•					1
000224	GRID	4025	· · · · · · · · · · · · · · · · · · ·	124.67	·		· · · · · · · · · · · · · · · · · · ·		 	·····								· · · · ·
000225	GRID	4030 .		121.28									· · ·					
000226	MAT1	7075	10.3E6			2.616E-								or or stand				
000227	PBAR	4000	7075	~139.933	51600.	51600.	1032007	. 0114										
000228	S****	*****	*****	****	*****	*****	*****	******	*****	*****	*****	c ik		•				
000229	3											<u> </u>	·		·			
000230	\$	COMPONE	NT NO - 5		PRESSUR	RETVESSELT	CLOSURE	•										
000231	\$	E000	E000	5000	4030								· '			•		
000232	CBAR CBAR	_5000 _5010	5000 5010	_5000 _5010	4030 5000	······································												 -
000234	GRID	5000	2010	115.97	5000 .							1			. :			
000235	GRID	5010		110.28									÷					
000236	PHAR	5000	7075	233.1	81850	81850	163700	0545		,			·					

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000237 000238	PBAR 5*****	5010	7075	290 • 28	64000.	64000.	12800.	•0545	****	****	*****	**					•		
000239	\$																		
000240	\$	CONPON	IENT NO.6		LOWER 1	THRUST ST	RUCTURE								•			•	
000241	\$																		•
000242	CBAR	6000	6000	6000	5010														
000243	CHAR	6010	6000	6010	6000														
000244	CBAR	6020	6000	_6020	6010											• • •			
000245	CBAR	6030	6000	6030	6020														
000246 00024 7	CBAR CBAR	6040 6050	6040	6040	6030		•						•						•
000247	CBAR	_6060	6050 6060	_6050 6060	_6040 6050								·	 ,,,	· ·				 -
000249	CBAR	6070	6070	6070	6060			•	•				•						
000250	GRID	6000	0070	98.0	0000									٠,					
000251	GRID	-6010 ⁻		86.33	·								·		·		 		
000252	GRID	6020	•	74.50		,												•	
000253	GRID	6030		68.58			•	• •		•						•	1		
000254	GRID	6040		57.0			3			· · ·		,					,	· · · · · · · · · · · · · · · · · · ·	
000255	GRID	6050		39.5				'. <u> </u>	e e		*		٠			;	i		
000256	GRID	6069		_32.38_			14 4									•	Ĺ		
000257	GRIU	6070		29.0												7			
000253	GRID	6080	8000	25.0	125.0	39.50		23456								i			
000259	GRID	6130	8000	25.0	215.0	39.50		23456							· ************************************				
000260 00026 1	MAT1 PBAR	7039 - 6000	10.1E6	3.78E6	0155	2.56E-4		0000		·	••	. * *		•					
000262	PBAR	6040	7039 7039	11.94 11.64	2155. 1989.	2155. 1989.	4310. 3978.	• 0282					į.			•			
000263	PBAR	_6050_	7039	10.681	1543.	1543.	3087.	•0282 •0282				· · · · · · · · · · · · · · · · · · ·				•			·
000264	. PBAR .	6060	7039	9.90	1228•	1228.	2456.	•0282											
000265	PHAR	6070	7039	9.58	1114.	1114.	2228	•0282			`	*,	;			٠,			•
993500	5*****	******	******	****	***	******			****	****	****	**							

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000268	5		IENT NO. 7	,	GIMBAL	tender (1) and an other decided	ուսուսում արտա	·ቚ፞፞፞፞፞ቝ፟፞፞፞፞ ^ፚ							•			•	
000268 000269	\$	COMPON											•	· ·	*		<u></u>		
000268 000269 000270	S CBAR		7031	7030	GIMBAL 7000	0.0	10.0	-10.0	1		7031								·
000268 000269 000270 000271	S CBAR +7031	COMPON 7031	7031 4	7030	7000				1						•.		<u></u>		
000268 000269 000270 000271 000272	\$ CBAR +7031 CBAR	COMPON	7031 4 7031			0.0	10.0	-10.0	1		7031 7032						······································		
000268 000269 000270 000271 000272 000273	S CBAR +7031 CBAR +7032	COMPON 7031 7032	7031 4 7031 4	7030 7030	7000 7040	0.0	10.0	10.0	1		7032						· · · · · · · · · · · · · · · · · · ·		,
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000268 000270 000271 000273 000273 000274 000275 000277 000277 000278 000279 000281 000282 000283 000284 000285 000286 000287 000288 000288 000289 000290 000291 000292	CBAR +7031 CBAR +7032 CBAR +7032 CBAR +7033 CBAR +7034 CONROD CON	7031 7032 7033 7034 7021 7022 7023 7024 7041 7042 7043 7044 7121 7122 7123 7124 7125 7126 7127	7031 4 7031 4 7031 4 7031 4 7020 7020 7020 7040 7040 7040 7040 8012 8012 8012 8012 8012	7030 7030 7030 7030 7030 7030 8001 8010 8030 8021 8022 8020 8000 8001 8002 8010 8001 8001	7000 7040 7010 7020 250 250 250 250 250 250 8005 8005 80	0.0 0.0 0.0 2.0 2.0 2.0 2.0 2.0	10.0	10.0	1 1 1		7032 7033								
000268 000270 000271 000273 000273 000274 000275 000277 000277 000278 000279 000281 000282 000283 000284 000285 000286 000286 000287 000288 000288 000289 000291 000293 000294	CBAR +7031 CBAR +7032 CBAR +7033 CBAR +7033 CBAR +7034 CONROD CON	7031 7032 7033 7034 7021 7022 7023 7024 7041 7042 7043 7044 7121 7122 7123 7124 7125 7126 7127 7128 7141	7031 4 7031 4 7031 4 7031 4 7020 7020 7020 7020 7040 7040 7040 8012 8012 8012 8012 8012 8012 8012 8012	7030 7030 7030 7030 7030 7030 8001 8010 8030 8031 8022 8020 8001 8001 8001 8001 8002 8010 8001 8001	7000 7040 7010 7020 250 250 250 250 250 250 8005 8005 80	0.0 0.0 0.0 2.0 2.0 2.0 2.0 2.0	10.0	10.0	1 1 1		7032 7033 7034								
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000297	CTRIAZ	7144	8012	8030	8025	7040						
000298	CTRIA2	7145	8012	8021	8020	7040						
000299	CTRIA2	7146	8012	8020	8022	7040	·			····		
000300 -	CTRIA2	7147	8012	8022	8030	7040						
000301	CTRIA2	7148	8012	8030	8021	7040		,				
000302	GRID	7000		23.0	0.0	-10.25						
000303 000304	GRID GRID	7010 7020		23.0 23.0	-10.25	10.25 : 0.0	•					
000304	GRID	7030		_23.0	-10.25 0.0	0.0					·	
000306	GRID	7040		23.0	10.25	0.0	•					
000307	MAT1	250	24.0F6	9.2456	10.23	7.33E-4				•		••••
000308	PBAR	7031	250	3.0	10.0	10.0	20.0				•	
000309	5*****	*****	*****	******	*******	*****	******	****	****	******	****	*
000310	ъ											
000311	s	COMPON	ENT NO. E	3	UPPER 1	HRUST ST	RUCTURE					
000312	5			•								
000313	CBAR	8000	8000	8090	8000	8160	0	0	2	····		;
000314	CBAR	8001	8000	8001	8040	8110	0 .	0	2			
000315 . 000316	CBAR	8002	0008	8170	8002	8110	0	. 0	2			
000317	CBARCBAR	8010 8021	8000 8000	_8010 8021	8050	8160 8140	0	0	<u>\$</u>			
000318	. CBAR	8022	8000	8050	8100 8022	8140	0	0	2			
000319	CBAR	8030	8000	8030	8180	8140	n	0 .	2			
000320	CBAR	8040	8000	8040	-8020	8140		<u> </u>	5		·	
00)321	CBAR	8050	8000	8050	8210	8160	Ď,	ő	2	,	, ,	
000322	CBAR	8052	8000	8190	8050	8140	Ö -	Ŏ	2			
000323	CBAR	8061	8170	8060	8080	-10.0	-10.	0.0	$\overline{1}$	8	061	
00J324	+8061			-3.4			-3.4			• • • • • • • • • • • • • • • • • • • •		
000325	CBAR	8065	8190	8060	8080	-10.0	-10.0	0.0	1	1 8	065	
000326	+8065			-2.5		,	-2.5					
000327	CBAR	8072	8000	8040	8070	8110	0	0	2			
000328	CBAR	8073	8170	8070	8060	-10.0	10•	0.0	1	8	073	
000329 000330	+8073 CBAR	8075	8190	-3.4	0060	-10.0	-3.4	0.6				in the contract of the contrac
000330	+8075	6073	0190	8070 -2.5	8060	-10.0	-10.0 -2.5	0 • 0	1	8	075	
000332	CBAR	8081	8000	8080	8040	8140	- <u></u>		2		-,	
000333	CBAR	8085	8190	8080	8090	-10.0	-10.0	-10.0	1		085	
000334	+8085	.,	0270	-2.5		20.00	-2.5	2000	•		00,5	
000335	CBAR	⁻⁸⁰⁹⁵	8190	8090	8120	-10.0	-3.75	-14.0	1	8	095	
000336	+8095			-2.5	•		-2.5					**
000337	CBAR	8105	8190	8100	8070	-10.0	-10.	10.	1	8	105	
000338	+8105			-2.5			-2.5	•				
000339	CRVK	8125	8190	8150	8170	-10.0	3.75	-14.0	1	8	125	
000340	+8125			-2.5			2•5					
000341 000342	CBAR	8155	8190	8150	8100	-10.0	-3.75	14.0	1	8	155	
000342	+8155 CBAR	8171	8170	- 2∙5 8170	8090 .	-10.0	-2.5 0.0	10.0			471	
000344	+8171			-3:4	6090 .	-10.0	-3.4	10.0	1 -		171	
000345	CBAR	8175	8190	8170	8190	-10.0	10.0	-10.0	1	. Ω	175	
000346	+8175	0	0,0	-2.5	0270	2000	-2.5	:	•	()	12.1.7	والمراجع والم والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراع
000347	CBAR	8181	8170	8180	8100	-10.0	0.0	10.0	1	8	181	
000348	+8181			-3.4			-3.4		•			
000349 .	CBAR	8165	8190	8180	8150	-10.0		. 14.0	1	8	185	
000350	+8185			-2.5			-2.5					
000351	CBAR	8191	8170	8190	8200	-10.	10.	0.	1	8	191	
000352	+8191			-3.4		سدير دير واراسا	-3.4			·	40	
00035 3 000354	+8195	8195	8190	-2190 -25	8200	-10.0	10.0	0.0	1	. 8	195	•
000355	CRVE	8201	8170	- 2.5 8200	8210	-10.	-2.5 10.	0.	1	^	201	
000335	+8201 · · ·			-3.4	02.20		- 3.4) E. U.L	e contra temperatura para anggarang anggarang anggarang ang anggarang ang ang ang ang ang ang ang ang ang
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000357	CBAR	8205	8190	8200	8210	-10.0	10.0	0.0	1	8205	•,		•	
000358 000359	+8205 CBAR	8215	8190	-2.5 8210	8180	-10.0	-2.5 10.			8215			 	
000360	+8215	0213	0190	-2.5	0100	-10.0	-2.5	10.	1	8212				· : !
000361	CODMEM	8006	8006	8040	8110.	8130	8001							
000362	CODMEM	8011	8006	8050	8160	8130	8010							
00036 3	CODMEM	8043	8006	8040	8110	8140	8020			•		[•	
000364	CODMEM	8192	8006_	8050	8160	8140	8022				, :	<u> </u>		
000365	CROD	8041	8041	8040	8110	8051	8041	8050	8160				,	
000366 000367	CROD	8071	8130	8110	8070	8161	8130	8190	8160	- 1		·		i
000368	CROD CROD	$\frac{8111}{8130}$	8130 8130	8110 8090	8140 8130	8140 8160	8130 8130	8140 8130	8180 8160					
000369	CROD	8162	8130	8160	8140	8163	8130	8140	8100		,			
000370	CROD	8171	8130	8170	8130	8131	8130	8130	8110					
000371	CROD	8210	8130	8160	8210	8110	8130	8080	8110		***************************************			
000372	CTRIA2	8001	8001	0008	8130	8090								
000373	CTRIA2	_8002_	8002_	8005	8130	8000			····	·				
000374 000375	CTRIA2 CTRIA2	8003	8002	8005	8130	8010				•	٠,		, <i>f</i>	
000376	CTRIA2	8004 8005	8001 8002	8002 8005	8130 8130	8170 8002	4		, , , , , , , , , , , , , , , , , , ,		• • •		· · /	
000377	CTRIA2	_800 7 _	8001	8040	8110	8070					- ::			
000378	CTRIA2	8008	8002	8005	8130	8001		5 ·		•			. 1	,
000379	CTRIA2	8012	8012	8000	8001	8005	•				•		1	
000380	CTRIAZ	8013	8012	8001	3010	8005	, , ,					· · · · · · · · · · · · · · · · · · ·		
000381	CTRIA2	8014	8012	8010	8002	. 8005		* 8					i i	
000382	CTRIAZ	_8015_	8012	8002	8000	8005	·····					, i		. 1
000333	CTRIA2	8026	8002	8025	8140	8020					•			
000384 000385	CTRIA2	8027 8031	8002 8001	8025	8140	8030	•	1						•
000335	CTRIA2 CTRIA2	_8031	8012	8030 8021	8140 8030	8189 8025								
000387	CTRIA2	8033	8012	8030	8022	8025		J. J. C.			•			,
000388	CTRIA2	8034	8012	8085	8020	8025	, · · · ·			*				•
000389	CTRIA2	8036	8012	8020	8021	8025	· · · · · · · · · · · · · · · · · · ·						 	
000390	· CTRIA2	8052	8001	8050	8160	8210								
000391	CTRIAZ	8082	8001	8040	8110	8080			•	•				
000392	CTRIA2	8121	8001	8090	8120	8170				•				
000393 000394	CTRIA2	815 1 8191	8001	8100	8150	8180	•	*.			. ,			
000395	CTRIA2	-8193-		8050 8025	8160 8140	8190 8022	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·						
000375	CTRIA2	8194	8002	8025	8140	8022					•		• •	•
000397	CTRIA2	8195	8001	8021	8140	8100				• . •		•		•
000398	GRID	-8000		17.0	-13.25	3.0								
000399	GRID	8001		17.0	- 7.25	3.0				•	,			•
000400	GRID	8002		17.0	-13.25					• •		• .	· · ·	
003401	GRID	8005		17.0	-10.25		,							
000402 000403	GRID GRID	8010 8020		17.0 17.0	-7.25 7.25	-3.0 3.0								•
000403	GRID GRID	-8021-		17.0	13.25_	3.0		······································				·····	· · · · · · · · · · · · · · · · · · ·	
000405	GRID	8022		17.0	7.25	- 3.0				•	7 7		•	
000406	GRID	8025		17.0	10.25	0.0						in the second se		
000407	GRID	-8030-		17.0	13.25	-3.0		······································						
000408	GRID	8040	•	. 17.0	0.0	10.25			•					·
000409	GRID	8050		17.0	0.0	-10.25								
000410	GRID	8060	0000	0.0	0.0	24.25	,						•	
000411	GRID GRID	8070 8080	8000 8000	28.0 28.0	60. 120.	0 • () 0 • ()					*			
000412	GRID	80 <i>5</i> 0	8000	28.0—	150.	. 0.0	· · · · · · · · · · · · · · · · · · ·						· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·
000413	GRID	8100	8000	28.0	30.	. 0.0					1			
000415	GRID	8110		0.0	0.0	10.25		*						
000416	GRID	8120	-0008	28.0	180.	• 0	·	/				· · · · · · · · · · · · · · · · · · ·		
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000417	GRID	8130		0.0	-10.25	• 0											!
000418	GRID	8140		0.0	10.25	• 0		•	,	*		•					i
000419	GRID	8150	8000	28.0	-0	•0											
000420 000421	GRID GRID	8160	9000	0.0	•0	-10.25			•								!
000421	GRID-	_8170 _8180	8000 8000	_28.0 _ _{28.0}	-150. -30.	•0	· · · · · · · · · · · · · · · · · · ·					·····					<u></u>
000423	GRID	8190	8000	28.0	-120.	•0					•	•					į
000424	GRID	8200	0001	0.0	•0	-24.25									•		1
000425	GRID	8210	8000	28.0	-60.	• 0				······································		<u>-</u>	—— <u> </u>		 		
000426	GRID	8300	8000	25.0	215.0	0.0	0	23456									
000427	GRID	_8400	8000	25.0	125.0	0.0	0	23456		: .			•				i
000428	MAT1	2024	10.5E6	4.0E6		2.6E-4											
000429 000430	PBAR	8000	2024	1.17	•08	•26											ļ
000431	PBAR PBAR	_8170 _8190	2024	0.50	4.3	0002		 		·			·				·
000431	PODMEM	8006	2024 2024	0.10	2.36	2.36	3.55	, i									
000432	PROD	8041	2024	0.35			:			•					,		. 1
000434	PROD	8130	2024	~0.435						•					· · · · · · · · · · · · · · · · · · ·	 ;	
000435	PTRIA2	8001	2024	0.064			.t.,	•	, · · · ·	, ·	•			٠.	,		\$!
000436	PTRIA2	8002	2024	0.20		·				•	·						:
000437	PTRIA2	8012	2024	•125				•				·			$\neg \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \!$		 j
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00044 1 000442	\$ 							* , *			. :		• • •				
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000444	. CROD	85011	8500 8500	8500 8501	8080 8090	85002 85012	8500 8500	8500 8501	8070 8060								į
000445	CROD	85u21	8500	8502	8060	85022	8500	8502	8100		;			٠,			
000446	CROD.	85031	8500	850 3	8120	85032	8500_	8503	8080-		······································		, , , , , , , , , , , , , , , , , , , 				
000447	CROD	85041	8500	8504	8970	85042	8500	8504	8150		•			• • •			· i
000448	CROD	85051	8500	8505	8170	85052	8500	8505	8090					•			- !
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000450	CROD	85071	8500	8507	8190	85072	8500	8507	8120				: :			•	i
000451	CROD	85081	8500	8508	8150	85082	8500	8508	8210			:				•	
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000454	CROD CROD	85101 85111	8500 8500	8510 8511	8180 8210	85102 85112	8500	8510 8511	8200			:.				٠	. !
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000456	GRID	8501	8000	68.933		-69.396		456						, •1			, ;
000457	GRID	8502	8000	68.933		-69.396		456		• .	,	•		, .	•		i
000458	GRID	8503	8000	68.933		-69.396		, 456			•						 j
000459	GRID	8504	8000	68.933		− 69•396		456 .						.:			. '
000460	GRID	8505	8000	68.933		-69.396		456				· · ·		<u> </u>			
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000467	PROD	8500	8500	-0.767							<u> </u>	· · · ·	···	······································			
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000469	CROD	86001	8600	8600	8701	86002	8600	. 860 0	8702					. '			į
000470	CROD	86011		8601	8703	86012	~ 860 0 ~	8601	8700								
000471	CROD	86021	8600	8602	8700	86022	8600	8602	8704	:			•				.
000472	CRÓD	86031	8600	8603	8705	86032	8600	8603	8701				<u> </u>		•	·* · · · · · · · · · · · · · · · · · ·	
000473	CROD CROD	86041 86051	8600 8600	8604	8702	86042	8600	8604	8706								
000474	CROD	86061	8600	8605 8606	8707 8704	86052 86062	8600 8600	8605 . 8606	8703 8703								1
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000477	CROD	86081	8600	8608	8706	86082	8900	8608	8710	
000478	CROD	86091	8600	8609	8711	86092	8600	8609	8707	
000479	CROD	86101	8600	8610	8708	86102	8600	8610	8711	
000480 _	CROD	86111	8600	8611	8710	86112	8600	8611	8709	
000481	GRID	8600	8000	80.0	90.	-219.0	8000	456		
900482	GRID	8601	8000	80.0	120.	-219.0	8000	456		
000483	GRID	8602	8000	80.0	60.	-219.0	8000	45€		
000484	GRID	8603	8000	80•	150.	-219.0	_8000_	456	····	
000485	GRID	8604	8000	80.	30.	-219.0	8000	456		
000486 00048 7	GRID GRID	8605	8000 8000	80. 80.	180. •0	-219.0 -219.0	8000 8000	456 456	:	
000488	GRID	8606 8607	8000	80•	-150.	-219.0	8000_	456 456		
000488	GRID	8608	8000	80.	-30.	-219.0	8000	1 456		
000490.	GRID	8609	8000	80.	-120•	-219.0	8000	456 .		
000491	GRID	8610	8000	80•	-60.	-219.0	8000	456		
000492	GRID	8611	8090	• 08	-90.	-219.0	8000	456		
000493	GRID	8700	8000	85.0	90.	-320.		456		
000494	GRID	8701	8000	85.0	120.	-3an•	^	456		
000495 .	GRIU	8702	8000	85.0	60.	-320.		456		
000496	GRID	8703	0008	85.0	150.					
000497	GRID	8704	8000	85.0	30.	-320.		456		
000498	GRID	8705	8000	85.0	180.	-320.		456	•	
000499	GRID	8706	0000	85.0		-320.	·	456		
000500	GRID	8707	8000	85.0	-150•	-320.		456		
000501 000502	GRID GRID	8708 8709	8000 / 8000	85.0 85.0	-30. -120.	-320. -320.		456 456	•	
000503	-GRID	8710	8000	85.0	-60.	-320·		456		
000504	GRID	8711	8000	85.0	-90.	-320.	,	456		
000505	PROD	8600	8500	0.868	70 •	OL.				k k
000506	MAT1	8500	5.75E6		0.3	1.75E=0				
00050 7	\$	ALL			ICE POIN	ITS ARE TO	REMAI	N IN THE	SAME PLAN	VE
000508	MPC	8700	8701	1	1.0	8700	1	-1.0.		
000509	MPC	8700	8702	_1	1.0	8700	1	-1.0		
000510	MPC	8700	8703	1	1.0	8700	1	-1.0		
000511	MPC	8700	8704	1	1.0	8700	1	-1.0		
000512	MPC MPC	8700 8700	8705 8706	1	1.0	8700 8700	Ţ	-1.0 -1.0		
000514	MPC	8700	8707	1 .	1.0	8700	1	-1.0		
000515	MPC	8700	8708	 -	1.0	8700		-1.0	· · · · · · · · · · · · · · · · · · ·	
000516	MPC	8700	8709	î	1.0	8700	î .	-1.0		
000517	MPC	8700	8710	ī	1.0	8700	` 1	-1.0	•	
000518	MPC	8700	8711	1	1.0	8700	1	-1.0		
000519	MPC	8700	8701	2	1.0	8700	2	-1.0		•
000520	MPC	8700	8702	2	1.0	8700	2	-1.0		
000521	MPC	8700	8703	2	1.0	8700	2	-1.0		
000522	MPC	8700	8,704	2	1.0	8700	2	-1.0		
000523	MPC	8700	8705		1.0	8700	2	-1.0		
000524	MPC	8700	8706		1.0	8700	2	-1.0		
000525	MPC	8700	8707	2	1.0	8700	2	-1.0		
000526	MPC MPC	8700 8700	8708 8709	2	$\frac{1.0}{1.0}$	8700 8700	_2 ·	-1.0 -1.0		and the second of the second o
000527	MPC	8700	8710	2	1.0	8700	2	-1.0		
000529	MPC	8700	8711	2	1.0	8700	2	-1.0		
000530	MPC	8700	8701		- <u>1.0</u> -	8700		-1.0		
000531	MPC	8700	8702	3	1.0	8700	3	-1.0		
000532	MPC	8700	8703	3	1.0	8700	3	-1.0		
000533	MPC	8700	8704	3	1.0	87nn	3	-1.0		
000534	MPC	8700	8705	3	1.0	8700	3	-1.0		
000535 000536	MPC MPC	8700 8700	8706 8707	3	-1·0 	8700 8700	3	$\frac{-1.0}{-1.0}$		
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000537	MPC	8700	8708	3	1.0	8700	3	-1.0		· .**					
000538	MPC	8700	8709	3	1.0	8700	3 .	-1.0		Ý		•			
000539	MPC	8700	8710	3	1.0	8700	3	-1.0							
000540	MPC	8700	8711	3	1.0	8700	3	-1.0	•						
000541	5			COORDINA	TE DATA					•					
000542	SPOINT	101	THRU	109						*					
000543	CMASS4	101	2.927	101			٠								1
000544	CMASS4	102	2.927	102		<i>:</i>				· · · · · ·	· .		·		
000545	CMASS4		0.664	103						,					
000546 00054 7	CMASS4	104	1.311	104		•			•			•			. (
000547	CMASS4	105	0.444	105					·						
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000552	CELAS4	204	0.2043 1.251E6			,									. !
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000555	CELAS4	207	6.729E5				· •		***			* **	.: '	, t,	!
000556	CELAS4	207	8.818E5		. :	•			i*		٠	* .	<i>i</i>		1
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000562	\$			GIMBAL.	. ACTUAT	rors				V.			· .		,
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APPENDIX A

CASE 6

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10 ELT E05/CASE6.1.720114. 42460

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000099	CONM2	9001	2050	2	0.15	28.82	17.6	-2.09	•						
000100	CONNS	9002	5010		•037	-3.36	12.4	7.12		····	<u> </u>	 	<u> </u>	· · · · · · · · · · · · · · · · · · ·	
00 1101	CONM2	9003	5010		1.19	-2.82	-06 1	• 0							
000102 000103	CONM2	9004 9005	6060 6050		0.98 86	2.42	-26.1 26.5	•0 14•5							
000103	CONM2	9006	6050		0.92	4.50	27.5	0.0							
000105	\$,		ICT SUBSY							•				
000106	\$					• .		į.					ris e se la como		
000107	5		NOZZLE	TO EXTE	NSION AT	TTACHMENT	·			······································					
000108	CONM2	2051	2050		•0855				•	NEA				•	
000109	+NEA	72.		36.		· · · · · · · · · · · · · · · · · · ·	36.				· · · · · · · · · · · · · · · · · · ·				
000110	5	3001		UPPORT	0 ((0	tr 03		•		65					
000111 000112	CONM2 +C5	3051 328•	3050	170•	0.668	-4,93	170•			ĊS			•		
000112	<u>\$</u>	J.O.	FLANGE				# (U •								
000113	CONM2	3052	3050	•	1.08	. 2.07		•		FLANGE	1.				
000114	+FLANGE		0000	298.	* 400	~70,	298•			1 27.1100					
000116	5		AFT RI								· 	1	· •	····	
	-			-											

	VRONAY	.428218.	1.100 FA	STRAND F	ILES MAN	IPULATION	<u> </u>	D.	ATE 03 APR 72	PAGE 1	6			
000117 000118	CONM2 +RING	2052 335•	2050	168•	0.40		168•		RIN	1G			٠	1
000119	5	2053	TORUS		0 100			,		N.10				
000120 000121	CONM2 +TORUS	2053 181•	2050	91.	0.198	-3.11	91.		TOF	RUS				i
000122	\$		NOZZI F	TO PV BOL	†s		31.							
000123	CONM2	3057	3050	10 14 000	•096	.1.07			BOL	TS ·				į
000124	+BOLTS			25.65			25.65		J				•	i
000125	5		CONTROL			(18)								· !
000126	CONMS	5011	5010	8000	•0344	24.5	10.		•	•				•
000127	CONM2	5012	5010	_8000	.0344	24.5	30.		· · · · · · · · · · · · · · · · · · ·					
000128 000129	CONM2	5013 5014	5010	0008	0344	24.5	50.				i i			·i
000129	CONM2	5014	5010 5010	8000 8000	•0344 •0344	24.5 24.50	70. 90.				•			i
000131	CONM2	_5016	5010	8000	0344	24.50	110.				····			
000132	CONM2	5017	5010	8060	.0344	24.50	130•						•	1
000133	CORM2	5018	5010	8000	.0344	24.50	150.							i
000134	CONM2	5019	5010	8000	.0344	24.50	170 • "					7		
000135	COMMS	50110	5010	8000	• 0344	24.50	190•	.,				1		
000136	CONM2	50111	5010	_8000	0344	_24.50	210.						·	
000137	CONM2	50112	5010	8000	.0344	24.50	230•	•				1		
000138	CONM2	50113	5010	8000	0344	24.50	250•		•			- 1		į
000139 000140	CONM2 CONM2	_50114 _50115	5010 5010	_8000	•0344 •0344	_24.50 24.50	270• 290•							!
000140	CONMS	50115	5010	8000 8000	.0344	24.50	310.		• •			•		,
000141	CONM2	50117	5010	8000	.0344	24.50	330			*, *	•			
000143	CONMS	50118	5010	-80CO	0344	24.50	350•	****						
000144	\$	001-0	SHIELD			_,,,,,				•				
000145	\$			S	HIEL	D RE	MOVE	D	,	•		3		
000146	OMITI	456	6010							: .				
000147	\$		NDICE										•	
000148	CONMS	6021	6020		1.55	r=			······································	٠.				
00:)149	. 5	40-01		VC.	TUATORS									1
000150 000151	CONM2 CONM2	60801	6080		0.24		•	1.	•	•			•	:
000151	CONMS	61301 83001	6130 8300		0.24									
000153	CONM2	84001	8400		0.24		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1						• •	
000154	5	34001	0400	SI	MPLE NSS								· ·	
000155	CONN2	4001	4001		29.									
000156 .	CONM2	4002	4002		6.02				, .			31	•	, !
000157	CONM2	4003	4003		2.90									<u> </u>
000158	5*****	******	******	******	*****	*****	*****	*****	*****	****				
000159	\$											f		!
000160	. \$	COMPON	ENT NO. 2) 	NOZZLE	EXTENSIO	N			·····				
000161	- 5 CDAD	2022	2020	2000	2000									1
000162 000163	CBAR CBAR	2020 2040	2020 2040	2020 2040	2000 2020	•				•				- 1
000164	CBAR	2050	2050	2050	2040									
000165	GRID	2000	2030	409.372				,	,					1
000166	GRID .	2020		351 - 543			•				ge er e	Bergins Berger		
000167	GRID	2040		296 - 865						· · · · · · · · · · · · · · · · · · ·				
000168	GRID	2050	•	270 • 190							*	*		i
000169	MAT1	100	1.7E6	_0.7056_		_1.355E-		·						i
000170	РВАК	2020	100		55550		111100.			,				7
000171	Pear	2040	100	33.253	30250	30250.	60500•	• 00445				•		1
U00172	PBAR	2050	100	50.047		25400. *******	50800.		<u> </u>					
000173 000174	\$****** 5	******	~*****	****	*****	·	~~~~~~	*******	· · · · · · · · · · · · · · · · · · ·	ጥጥሞሞሞ .				i
000174	⊅ ¶	СОМРОМ	ENT NO. 3	,	NOZZLE									. i
000175								··· · · · · · · · · · · · · · · · · ·			· · · · · · · · · · · · · · · · · · ·			
333.3	-	•												,

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		3000	3000	3000	2050							•		· · ·	•	·		
000178 000179	CBAR	3010	3010	3010	3000		<u> </u>											_
000179	CBAR	3020 3030	3020 3030	3020	3010	•		•				,		•			•	1
000180	CBAR CBAR	3040	3040	3030 3040	3020 3030.	•						•	•	•				1
000182	CBAR	3050	3050	3050	3040													+
000183	GRID	3000	0000	254.218	0010		,					•		•	•			
	GRID	3010		233.25			•							• .				i
	GRID	3020		225.90								1						
000186	GRID	3030		220.491		•					•		•					- !
000137	GRID	3040		213.236				÷ .'		:								1
000188	GRID	3050		206.93		· · · · · · · · · · · · · · · · · · ·	•											-
000189	MAT1	347	29.3E6	11.4E6		7.394E-	4	·						•				i.
000190	PBAR	3000	347	11.5	3414.	3414.	6828	•007	٠,						<u>.</u>			1
000191	PEAR	3010	347	32.3	4371 •	4371.	8742.	•007										ī
000192	PBAR	3020	347	16.3	567.	567•	1133.	•00 7 ·				•				*		
000193	PBAR	_3030	_347	13.7	333.	_333•	_666•	007	· · · · · · · · · · · · · · · · · · ·		·	,						
000194	PBAR	3040	347	25.2	2070•	2070.	4140.	•007										1
000195	PEAR	3050	347	82.2	16170.	16170.	32340.	•007							i			:
000196	5*****	*****	*****	*****	*****	*****	*****	*****	****	****	***				<u> </u>			
000197	3	Muct CAD	SUBSYST	-11	CTUBLE	MODEL							•		1			
000198 000199	\$. 5	NOCLEAR	30031310	⊑ 141	SIMPLE	MOUP.L					. ;				į			1
000199	CELAS2	40011	41.3E6	4001		3050			······································				• • • • • • • • • • • • • • • • • • • •					+
000201	CELAS2	40012	9.41E6	4001	2	3050	2				•					100		- 1
00 1202	CELAS2	40012	9.41E6	4001	3	3050	3			•				•	•	• • •		-
00.1203	CELAS2	40021	334.E6	4002	- ĭ	4001	- ĭ					 						- †
	CELAS2	40022	61.7E6	4002	2	4001	2						. ,	•	•			1
000205	CELAS2	40023	61.7E6	4002	3	4001	3				•			.,			•	!
000206	CELAS2	40031	0.48E6	4003	1	4002	1		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			 	 -					÷
000207	CELAS2	40032	16.5E6	4003	2	4002	2		• .					•				1
000208	CELAS2	40033	16.5E6	4003	3	4002	3					٠.		٠.				i
000209	GRID	4001		170.0	•			456			· · · · · · · · · · · · · · · · · · ·	· ····································	·······		*****			T
000210	GRID	4002		129.0				456					•					1
000211	GRID	4003		124.0				456							•			
000212	~~************************************	****	*****	******	******	****	*****	*****	*****	*****	****	:		,,	,			7
000213	\$	COUDONE	NT NO 1		DDECCUDE	- 45.6661						1.00	1	, i			,	ì
000214	<u>s</u>	COMPONE	NT NO. 4		PRESSURE	E VESSEL					<u></u>		<u> </u>					
000215 000216	CDAP	4000	4.000	4000	3050		-	;		•			•					1
000217	CBAR CBAR	4000 4010	4000 4000	4000 4010	3050 4000		•		•	•				• • • • • • • • • • • • • • • • • • • •				1
000217	CBAR	4020	4000	4020	4010		· · · · · · · · · · · · · · · · · · ·			·		-,						-
000219	CBAR	4025	4000	4025	4020			•					,				•	
000220	CBAR	4030	4000	4030	4025						•							i
000221	GRID	-4000		185.517						· · · · · · · · · · · · · · · · · · ·	·		·	~	· · · · · · · · · · · · · · · · · · ·		•	$\dot{+}$
000222	GRID .	4010		164 • 105	-			•										- 1
000223	GRID	4020		142 - 692	5			•	•									- } '
000224	GRID	-4025		124-67	·									·				+
000225	GRID	4030		121.28							•							i !
000226	MAT1	7075	10.3E6	3.9E6		2.616E-	4								V 12 -			ì
000227	PBAR	4000	7075		51600.	51600.		0114			·	·						十
000228	\$*****	****	****	*****	****	*****	****	****	******	*****	***							
000229	5					•												- 1
060536	5	"COMPONE	NT NO. 5		PRESSURI	EVESSEL	CLOSURI	E										+
000231	\$						•											}
000232	CBAR	5000	5000	5000	4030			:				•		•	•			!
000253	CBAR	-5010	5010	-5010	5000													
000234	GRID	5000		115.97														i
000235	GRID	5010		110.28	~~~											~~~		
000236	PHAR	5000	7075	23341	81820.	81850.	162/00	· • 0545	•				,	•				i

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000237 000238	P8AR 5*****	5010 *****	7075 ******	290+28	64000.	64000. *****	12800.	• 0545 *****	****	*****	**				• • • • • • • • • • • • • • • • • • • •	
000239	 \$						+									-+
000240	\$	CONPON	ENT NO.6		LOWER 1	THRUST ST	RUCTURE								•	•
000241	\$												•			1
000242	CBAR	6000	6000	6000	5010											
000243	CBAR	6010	6000	6010	6000						*		*		•	1:
000244	CBAR	6020	6000	_6020	_6010						•,	2000	<u> </u>			<u> </u>
000245	CHAR	6030	6000	6030	6020											4
000246	CBAR	6040	6040	6040	6030			•			<i>:</i>	•	• ,			1
000247	CBAR	_6050_	6050	6050	6040			·			·					
000248	CBAR	6060	6060	6060	6050											1
000249 000250	CBAR GRID	6070 6000	6070	6070	6060					•						1
000251	GRID	6010		98.0				 				 			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
000252	GRID	6020		86.33 74.50		2	ė									i
000253	GRID	6030		68.58												;
000254	GRID	_6040		57.0			 									
000255	GRID	6050		39.5				:	•					;		:
000256	GRID	6060		32.38			, (· .	•	1.5		-	<i>:</i>	•	!
000257	GRID	-6070	,	29.0									`	-i		
000258	GR1D	6080	8000	25.0	125.0	39.50	•	23456		•		s.		1		i
000259	GRID	6130	8000	25.0	215.0	39.50	,	23456			100			ļ		į i
000260	MAT1	7039	10.1E6	3.7856		2.56E-4	1		· · · · · · · · · · · · · · · · · · ·			· · · · · · · · · · · · · · · · · · ·		T :		 1-
000261	PBAR	6000	7039	11.94	2155.	2155.	4310.	•0282		,			• • • • •		_	ļ.
000262	PBAR	6040	7039	11.64	1989.	1989.	3978.	.0282	•	•			•		:	l i
000263	PBAR	~6050~	7039	10.681	1543.	1543.	3087.	·0282					,			
000264	. PBAR	6060	7039	9.90	1228.	1228.	2456.	.0282		. •	•					į
000265	PBAR	6070	7039	9.58	1114.	1114.	2228.	•0282		•			•			i
000266	5*****	*****	*******	******	*****	******	*****	****	*****	*****	**					
000267	\$													•		ļ
000268	\$	COMPON	VENT NO. 7	,	GIMBAL										· · · · ·	
000269	\$				_	_	. 1				٠.					i
000270	CBAR	7031	7031	7030	7000	0.0	10.0	-10.0	1	7031						· i ·
000271	+7031	A	4				·									
000272	CBAR	7032	7031	7030	7040	0.0	10.0	10.0	1	7032			1			l i
0002 73 000274	+7032	7077	4 7071	7070	7010	0.0	10.0									į
000274	CBAR +7033	7033	7031	7030	7010	0.0	-10.0	10.0	1	7033			er da	· · · · · · · · · · · · · · · · · · ·		<u> </u>
000275	CBAR	7034	7031	7030	7020	0.0	-10.0	-10.0	•	7070						7. F
000277	+7034	1034	4	7030	1020	0.0	-10.0	-10.0	. .	7034	• •					Í
000278	CONROD															 - ·
		7021	7020	8001	250	2.0										
000279		7021 7022	7020 7020	8001 8010	250 250	2.0										. !
000279 000280	CONROD	7022	7020	8010	250	2.0		•								. !
000280 000281								•	:							·
000280 000281 000282	CONROD CONROD	7022 7023	7020 7020	8010 8002 8000 8030	250 250	2.0 2.0 2.0				,						
000280 000281 000282 000283	COMROD COMROD COMROD COMROD COMROD	7022 7023 7024 7041 7042	7020 7020 7020	8010 8002 8000	250 250 250	2.0 2.0		•								
000280 000281 000282 000283 000284	COMROD COMROD COMROD COMROD COMROD COMROD	7022 7023 7024 7041 7042 7043	7020 7020 7020 7040 7040 7040	8010 8002 8000 8030 8021 8022	250 250 250 250 250 250	2.0 2.0 2.0 2.0	;									
000280 000281 000282 000283 000284 000285	COMROD COMROD COMROD COMROD COMROD COMROD COMROD	7022 7023 7024 7041 7042 7043 7044	7020 7020 7020 7040 7040 7040 7040	8010 8002 8000 8030 8021 8022 8020	250 250 250 250 250 250 250 250	2.0 2.0 2.0 2.0 2.0 2.0 2.0	;									
000280 000281 000282 000283 000284 000285 000286	COMROD COMROD COMROD COMROD COMROD COMROD COMROD CTRIA2	7022 7023 7024 7041 7042 7043 7044 7121	7020 7020 7020 7040 7040 7040 7040 8012	8010 8002 8000 8030 8021 8022 8020 8000	250 250 250 250 250 250 250 250 8005	2.0 2.0 2.0 2.0 2.0 2.0 2.0 7020										
000280 000281 000282 000283 000284 000285 000286	COMROD COMROD COMROD COMROD COMROD COMROD COMROD COMROD COMROD CTRIA2	7022 7023 7024 7041 7042 7043 7044 7121	7020 7020 7020 7040 7040 7040 7040 8012 8012	8010 8002 8000 8030 8021 8022 8020 8000 8001	250 250 250 250 250 250 250 250 8005	2.0 2.0 2.0 2.0 2.0 2.0 2.0 7020										
000280 000281 000282 000283 000284 000285 000286	COMROD COMROD COMROD COMROD COMROD COMROD COMROD COMROD CTRIA2 CTRIA2	7022 7023 7024 7041 7042 7043 7044 7121 7122 7123	7020 7020 7020 7040 7040 7040 7040 8012 8012	8010 8002 8000 8030 8021 8022 8020 8000 8001 8002	250 250 250 250 250 250 250 250 8005 8005	2.0 2.0 2.0 2.0 2.0 2.0 2.0 7020 7020										
000280 000281 000282 000283 000284 000285 000286 000287 000286 000289	COMROD COMROD COMROD COMROD COMROD COMROD COMROD CTRIA2 CTRIA2 CTRIA2	7022 7023 7024 7041 7042 7043 7044 7121 7122 7123 7124	7020 7020 7020 7040 7040 7040 7040 8012 8012 8012 8012	8010 8002 8000 8030 8021 8022 8020 8000 8001 8002 8010	250 250 250 250 250 250 250 250 8005 8005	2.0 2.0 2.0 2.0 2.0 2.0 2.0 7020 7020 70										
000280 000281 000282 000283 000284 000285 000286 000287 000288 000289	COMROD COMROD COMROD COMROD COMROD COMROD CTRIA2 CTRIA2 CTRIA2 CTRIA2	7022 7023 7024 7041 7042 7043 7044 7121 7122 7123 7124 7125	7020 7020 7020 7040 7040 7040 7040 8012 8012 8012 8012 8012	8010 8002 8000 8030 8021 8022 8020 8000 8001 8001	250 250 250 250 250 250 250 250 8005 8005	2.0 2.0 2.0 2.0 2.0 2.0 2.0 7020 7020 70										
000280 000281 000282 000283 000284 000285 000286 000287 000288 000289 000290	COMROD COMROD COMROD COMROD COMROD COMROD CTRIA2 CTRIA2 CTRIA2 CTRIA2 CTRIA2 CTRIA2 CTRIA2	7022 7023 7024 7041 7042 7043 7044 7121 7122 7123 7124 7125 7126	7020 7020 7020 7040 7040 7040 7040 8012 8012 8012 8012 8012 8012	8010 8002 8000 8030 8021 8022 8020 8000 8001 8002 8010 8001 8001	250 250 250 250 250 250 250 8005 8005 80	2.0 2.0 2.0 2.0 2.0 2.0 7020 7020 7020 7										
000280 000281 000282 000283 000284 000285 000286 000287 000288 000289 000290 000291 000292	COMROD COMROD COMROD COMROD COMROD COMROD COMROD CTRIA2 CTRIA2 CTRIA2 CTRIA2 CTRIA2 CTRIA2 CTRIA2	7022 7023 7024 7041 7042 7043 7044 7121 7122 7123 7124 7125 7126 7127	7020 7020 7020 7040 7040 7040 7040 8012 8012 8012 8012 8012 8012 8012	8010 8002 8000 8030 8021 8022 8020 8000 8001 8001 8001 800	250 250 250 250 250 250 250 8005 8005 80	2.0 2.0 2.0 2.0 2.0 2.0 7020 7020 7020 7										
000280 000281 000282 000283 000284 000285 000286 000286 000289 000290 000291 000292	COMROD COMROD COMROD COMROD COMROD COMROD COMROD CTRIA2 CTRIA2 CTRIA2 CTRIA2 CTRIA2 CTRIA2 CTRIA2 CTRIA2	7022 7023 7024 7041 7042 7043 7044 7121 7122 7123 7124 7125 7126 7127	7020 7020 7020 7040 7040 7040 8012 8012 8012 8012 8012 8012 8012 801	8010 8002 8000 8030 8021 8022 8020 8000 8001 8002 8010 8001 8001	250 250 250 250 250 250 250 8005 8005 80	2.0 2.0 2.0 2.0 2.0 2.0 7020 7020 7020 7										
000280 000281 000282 000283 000284 000285 000286 000287 000288 000289 000290 000291 000292 000293 000294	COMROD COMROD COMROD COMROD COMROD COMROD COMROD CTRIA2 CTRIA2 CTRIA2 CTRIA2 CTRIA2 CTRIA2 CTRIA2 CTRIA2 CTRIA2 CTRIA2 CTRIA2 CTRIA2 CTRIA2 CTRIA2 CTRIA2	7022 7023 7024 7041 7042 7043 7044 7121 7122 7123 7124 7125 7126 7127 7128 7141	7020 7020 7020 7040 7040 7040 8012 8012 8012 8012 8012 8012 8012 801	8010 8002 8000 8030 8021 8022 8020 8000 8001 8001 8001 800	250 250 250 250 250 250 8005 8005 8005 8	2.0 2.0 2.0 2.0 2.0 2.0 7020 7020 7020 7										
000280 000281 000282 000283 000284 000285 000286 000287 000288 000289 000290 000291 000292 000293 000294 000295	COMROD COMROD COMROD COMROD COMROD COMROD COMROD CTRIA2	7022 7023 7024 7041 7042 7043 7044 7121 7122 7123 7124 7125 7126 7127 7128 7141 7142	7020 7020 7020 7040 7040 7040 7040 8012 8012 8012 8012 8012 8012 8012 801	8010 8002 8000 8030 8021 8022 8020 8000 8001 8001 8001 800	250 250 250 250 250 250 250 8005 8005 80	2.0 2.0 2.0 2.0 2.0 7020 7020 7020 7020										
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000297	CTRIA2	7144	8012	8030	8025	7040		•	,							
362000	CTRIA2	7145	8012	8021	8020	7040					•					
û00299	CTRIA2	7146	8012	0803	8022	7040	·									
000300	CTRIA2	7147	8012	8022	8030	7040										1
000301 00)302	CTRIA2	7148	8012	_8030	8021	_7040										1
060303	GRID	7000		23.0	0.0	-10.25	,									
000304	GRID GRID	7010 7020		23.0	0.0	10.25										1
000305	GRID	7030		_23.0	10.25	0.0					· · · · · · · · · · · · · · · · · · ·					
000306	GRID	7030		23.0 23.0	0.0	0.0										
000303	MAT1	250	24.0E6	9.24E6	10.25	0.0 7.33E-4										!
000308	PBAR	7031	250	3.0	10.0	10.0	20.0						· .			· · · · · · · · · · · · · · · · · · ·
000309	5*****	*****	******	******	*****	*****	****	نال بالدريل بالدريل بالدريل بالدريل	An an an an an an an an	. مدار داد الدار داد الدار داد الدار داد	444.					i
000310	\$						~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	~~~~~~~	~~~~~	***	***	• .•	N			į
000311	\$	COMPON	ENT NO. 8		UPPER T	HRUST "ST	RUCTURE									
000312	\$													•		ļ
000313	CBAR	8000	8000	8090	8000	8160	0	0	2		•					
000314	CBAR	8001	8000	8001	8040	8110	- <u>Ö</u>	0	2	•		 				
000315	CBAR	8002	8000	8170	8002	8110	0	Ŏ	2					,		i
000316	CBAR	8010	0008	8010	.8050	8160	0	0	2				•			i
000317	CBAR	8021	8000	8021	8100	8140	0	0	2				 			
000318	CDAR	8022	0008	8050	8022	8140	0	0 ·	2		•			1	•	į
000319	CBAR	_8030	8000	8030	8180	8140	Ō	0 '	2							ţ
000320	CBAR	8040	8000	8040	8020	8140	0	0	2.							
000321	CBAR	8050	8000	8050	8210	8160	O .	0 .	2		•				·	
000322	CBAR	8052	0000	_8190	_8050	8140	0 .	0	2 .			•		. •		į
000323	CBAR	8061	8170	8060	~8080 ~~~	-10.0	-10.	0.0	1	8061		·				
000324 000325	+8061	0045	0100	-3.4			-3.4									. 1
000325	CBAR	8065	8190	_8060	8080	-10.0	-10.0	0.0	1	8065	`. :			1		1
000327	+3065	0070	0000	- 2.5			-2.5					:			······································	
000328	CBAR Char	8072 8073	8000	8040	8070	8110	0	0	2		•		·			ļ
000329	+8073	00/3	8170	8070	8060	-10.0	-10.	0.0	1	8073						
000330	CBAR	8075	8190	-3.4	0040	-10.0	-3.4		•							
000331	+8075	0073	0190	8070 -2.5	8060	-10.0	-10.0	0.0	1	8075				•		į-
000332	CBAR	8081	8000	8080	8040	8140	-2.5 0		·							1
000333	CBAR	8085	8190	0808	8090	-10.0	-10.0	0	2	0005						
000334	+8085	000,0		-2.5	0090	-20.00	-2.5	-10.0	1	8085			in the second			. !
000335	CBAR	-8095	8190	-8050	8120	-10.0	-3.75	-14.0		8095	<u>.</u>	<u> </u>	`	<u> </u>	<u> </u>	<u> </u>
000336	+8095			-2.5	021.0	2000	-2.5	-14+0		8,093				:		i
000337	CBAR	8105	8190	8100	8070	-10.0	-10	10.	1 .	8105			. "	•		
000338	+8105			-2.5			-2.5			0.0.7	<u> </u>					
000339	CHAR	8125	8190	8120	8170	-10.0	3.75	-14.0	1	8125						. 1
000340	+8125			-2.5	-		-2.5		-	0160		*		•		į
000341	CBAR	8155	8190	8150	8100	-10.0	-3.75	14.0	1	8155			· .,			
000342	+8155			-2.5			-2.5			5200		•	•			•
000343	CBAR	8171	8170	8170	8090	-10.0	0.0	10.0	1 .	8171						i
000344	+8171			-3.4		***************************************	-3.4	1		·						
000345	CBAR	8175	8190	8170	8190	-10.0	10.0	-10.0	1	8175	•	•	• •		•	. 1
000345	+8175			-2.5			-2.5					, . Seg.,	40			!
000347	CBAR	8181	8170	8180	8100	-10.0	0.0	10.0	1	8181						
000348 000349	+8181	0105	0100	-3.4			-3.4				•			,		!
000350	CBAR	8185	8190	8180	8150	-10.0	3.75	14.0	1	8185						1
000350	+8185 CBAR	8191	0170	-2.5	0000		-2.5					· · · · · · · · · · · · · · · · · · ·				
000352	+8191	0141	8170	8190	8200	-10.	10.	0.	1	8191		•		•		. i
000353	CBAR	8195	8190	-3.4	-0200		-3.4							•		. !
000354	+819 5	J 4 7 J	U 1 7 U	-8190 -2•5	8200	-10.0	10.0	0 • 0	1	8195						
000355	CBAR	8201	8170	8200	8210	-in.	- 2.5	0			•			•		i i
000356	+8201			-3.4	OCIU		10.	0.	1	8201					<u> </u>	
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	VRONAY	,428218	3,1,100 F	ASTRAND	FILES MAN	IPULATI	ON		DATE 03	APR 72 1	PAGE	20	· .	parentage at the same	\
000357	CBAR	8205	8190	8200	8210	-10.0	10.0	0.0	1	8205				•	-
000358 000359	+8205	0.V-4.E	0.100	-2.5			-2.5					· · ·			<u></u> i
000359	CEAR +8215	8215	8190	8210 -2.5	8180	-10.0	10.	10.	ı	8215					1
000361	CODMEM	8006	8006	8040	8110.	8130	-2.5 8001	•				•	•	•	Į,
000352	CODNEM	8011	80.06	8050	8160	8130	8010			·					
000363	CGDMEM	8043	8006	8040	8110	8140	8020					٠.			ie
000364	CODMEM	8192	8006	8050	8160	8140	8022						•		1
000365	CROD	8041	8041	8040	8110	8051	8041	8050	8160		:				
000366	CROD	8071	8130	8110	8070	8161	8130	8190	8160	•				*	. !
000367	CROD	8111	8130	8110	8140	8140	8130	8140	8180				•		:
000368	CROD	8130	8130	8030	8130	8160	8130	8130	8160		1-1-1-1-1-1			,	
000369	CROD	8162	8130	8160	8140	8163	8130	814.0	8100						Ì
000370	CROD	_8171_	8130	8170	8130	_8131	8130	8130	8110					**	
000371	CROD	8210	8130	8160	8210	8110	8130	8080	8110					•	
000372 .	CTRIA2	8001	8001	8000	8130	8090								•	!
000373	CTRIA2_	_8002_	8002	8005	8130	8000							·		
000374 /	CTRIA2	8003	8002	8005	8130	8010	N.		•						i
000375 . 000376	CTRIA2	8004	8001	8002	8130	8170			. •	*				• •	1
000378	CTRIA2_ CTRIA2_	_8005 800 7	8002 8001	8005 8040	8130	8002 8070			· · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·		 		· · · · · · · · · · · · · · · · · · ·	
000377	CTRIA2	8008	8002	8005	8110 8130	8001			**		•		.	•	. !
000379	CTRIA2	8012	8012	8000	8001	8005							·		i
000380	CTRIAZ	-8013-	8012	8001	8010	_8005							· · · · · · · · · · · · · · · · · · ·		
000381	CTRIA2	8014	8012	8010	8002	8005					•		•	•	i
0¢0382	CTRIA2	8015	8012	8002	8000	8005	•	•	•						!
000383	CTRIA2	8026	8002	8025	8140	8020									
000384	· CTRIA2	8027	8002	8025	8140	8030									. :
000385	CTRIA2	8031	8001	8030	8140	8180	•	* * *		:		•	•		1
003386	CTRIA2	_8032_	8012	8021	3030	8025							· · · · · · · · · · · · · · · · · · ·		
00038 7	CTRIA2	8033	8012	8030	8022	8025				1	, :				į
000388	CTRIA2	8034	8012	8022	8020	8025					1, 4, 4				ı
000389	CTRIA2	8036	8012	8050	8021	8025			,						
000390	CTRIA2	8052	8001	8050	8160	8210	•	: · · · · · · · ·	,		•				į
000391 000392	CTRIA2	8082	8001	8040	8110	8080	· · <u>· · · · · · · · · · · · · · · · · </u>		 		· · · · · · · · · · · · · · · · · · ·				,
000393	CTRIA2	8121 8151	8001	8090	8120	8170								•	
000393	CTRIA2	8191	8001 8001	8100 8050	8150 8160	8180 . 8190			• • • • • • • • • • • • • • • • • • • •		.5.**			•	i
000395	CTRIA2	8193	8002	8025	8140	8022		·····			<u> </u>	• • • •		·····	<u></u>
000396	CTRIA2	8194	8002	8025	8140	8021				•	•		. 23		· []
000397	CTRIA2	8195	.8001	8021	8140	8100				•		•		•	,
000398	GRID	8000		17.0	-13.25	3.0			· · · · · · · · · · · · · · · · · · ·						 -
000399	GRID	8001		17.0	-7.25	3.0				-					· i
00040 0	GRID	8002		17.0	-13.25	-3.0									İ
000401	GRID	~800 5 ~~		17.0	-10.25	0.0								· · · · · · · · · · · · · · · · · · ·	
000402	GRID	8010		17.0	. - 7.25	-3.0 .				•	:				
000403	GRID	8029		17.0	7•25 .	3.0	• •		•	•	*.			4	į
000404	GRID	8021		17.0	13.25	3.0			,				4		
00:)405	GRID	8022	• ,	17.0	7.25	-3.0	•				•			•	. ;
000406	GRID .	8025		17.0	10.25	0.0						100	and the following the		
000407	GRID	8030		17.0	13.25	-3.0									
000408	GRID	8040		17.0	0.0	10.25	•		· · · · .	•			•		;
000409	GRID	_8050 8060		17.0	0•0	-10.25			- 				·		i-
000411	GRID GRID	8060 8070	8000	0.0 28.0	0.0	24.25				•				,	1
000412	GRID	8070	8000	28.0	60. 120.	0.0 0.0	•					:	•		
000412	GRID	-8090	8000	28•0 28•0	150.	-0.0									L
000414	GRID	8100	8000	28.0	30.	0.0		•	•						1
000415	GRID	8110		0.0	U.O	10.25			•					•	1
000416	GRID	8120		28.0	180.	0									
	•		-	· ·	-	-	•								•

	VRONAY	,428218,1,1	00 FASTRAND F	ILES MAN	NIPULATION		DATE 03 APR 72 PAGE 21
000417	GRID	8130	0.0	-10.25	•0		
000418	GRID	8140	0.0	10.25	• 0		
000419	GRID	8150 80	00 28.0	• 0	•0		
000420	- GRID	8160	0.0	• 0	-10.25 .		
000421	GRID		28.0	150.	•0		·
000422 000423	GRID GRID		00 28.0 00 28.0	-30. -120.	• 0		
000424	GRID	8200	00 28.0 0.0	•0	•0 -24•25		
000425	GRID		28.0	-60.	• 0		
000426	GRID		00 25.0	215.0	0.0 0	23456	
000427	GRID	8400 80	000 25.0	125.0	0.0	23456	
000428	MAT1	2024 10	5E6 4.0E6		2.6E=4		
000429	PBAR		124 1.17	•08	•26		
000430	PBAR		0.50	4.3	•0005	<u> </u>	
000431	PBAR PQDMEM		124 • 8 124 • 0 • 10	2.36	2•36 3•5		· ·
000432	PROD		24 0.35				
000434	PROD		24 0.435				
000435	PTRIA2	-	0.064			•	
000436	PTRIA2	8002 20	0.20		·		
000437	PTRIA2		125				
000438	5*****	******	*****	****	*****	*****	*********
000439					~		
000440	\$		M 1	N I -	TANK .		
000441 000442	. <u>\$</u>		1.0	WED INE	T) TRUSS		
000443	CROD	85001 85	8500	8080	85002 850	0 8500	8070
000444	CROD		500 85C1	8090	85012 850		8060
000445	CROD		500 850 2	8060	85022 850		8100
000446	CROD		8503	8120	85032 850		8080
000447	CROD		500 8504	8070	85042 850		8150
000448	CROD		500 8505	8170	85052 850		8090
000449	CROD	•	8506	8100	85062 850		8180
000450	CROD		8507	8190	85072 850		8120
000451	CROD		8508	8150	85082 850		8210
000452	CROD		8509	8200	85092 850 85102 850		8170 8200
00045 3 000454	CROD CROD		500 8510 500 8511	8180 8210	85112 850		8190
000455	GRID-		00068.9330		-69.3969800		
000456	GRID	-	000 68.9330		-69.3969800		$oldsymbol{n}$
000457	GRID		000 68.9330		-69.3969800		
000458	GRID		68.9330		-69.3969800		
000459	GRID		000 68.9330		-69.3969800	**	
000460	GRIŪ		000 68.9330		-69.3969800		
003461	GRID		68,9330		-69-3969800		
000462	GRID		000 68.9330 000 68.9330		-69.3969800 -69.3969800		
000463 000464	GRID		000 68.9330 000 68.9330		-69.3969800 -69.3969800		
000464	GRID		000 68.9330		-69.3969800 -69.3969800		
000466	GRID .		08.9330		-69.3969800		
000467	PROD		0.767				
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000469	CROD		8600	8701	86002 860		8702
000470	CROD		8601	8703	86012 860		8700
000471	CROD		500 8602	8700	86022 860		8704
000472	CROD		8603	8705	86032 860		8701
0004 73 000474	CROD CROD		500 8604 500 8605	8702 8707	86042 860 86052 860		8706 8703
000474	CROD		500 8605 500 8606	8707	86062 860 86068 860		8708
000476	CROS-		8607	8709	86072860		8705
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000477 000478	CROD CROD	86081 86091	8600 8600	8608 8609	8706 8711	86082 86092	8600 8600	8608 8609	8710 8707		
000479	CROD	86101	8600	8610	8708	86102	8600	861.0	8711		
000480	CROD	86111	8600	8611	8710	86112	8600	8611	8709		
000481	GRID	8600	8000	80.0	90•	-219.0	8000	456			
000482	GRID	8601	8000	80.0	120.	-219.0		456		,	
00348 3 -003484	GRID GRID	8602 8603	8000 8000	80.0 80.	60. 150.	-219.0 -219.0	8000 8000	456 456		· · · · ·	
000485	GRID	8604	8000	80.	30.	-219.0	_8000_	456	· · · · · · · · · · · · · · · · · · ·		
000486	GRID	8605	8000	80.	180.	-219. 0	8000	456			
000487	GRID	8606	8000	80.	•0	-219.0	8000	456		, .	!
000488	GRID	8607	8000	80.	-150•	-219.0	8000	456	· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·
000489 .	GRID	8608	8000	80.	-30.	-219.0	8000	456	•		
000490	GRID	8609	8000	80.	-120•	<u>~219.0</u>	_8000	456			
000491	GRID	8610	8000	೮0.	-60.	-219.0	8000	456			
000492	GRID	8611	8000	80.	-90.	-219.0	8000	456 456			
000493	GRID GRID	8700 8701	8000 8000	_85 .0	90. 120.			456 456	·		· · · · · · · · · · · · · · · · · · ·
000494	GRID	8702	8000	85.0	60.	-320. -320.	*1	456	•		
000495	GRID	8703	8000	85.0	150.	-320		456			
000497	GRID	8704	8000	85.0	30.	-320.		456	,		
000498	GRID	8705	8000	85.0	180.	-320.		456			/
000499	GRID	8706	8000	85.0	• 0	-320•	100	456			,
000500	GRID	8707	8000	85.0	-150•	-320.		456		4	
000501	GRID	8708	8000	85.0	-30.	- 320∙		456			,
000502	GRID	8709	8000	85.0	-120•	- 320•		456		1	
000503	GRID	8710	8000	85.0	-60•	-320•		456			
000504 000505	GRID PROD	. 8711 8600	8000 8500	85.0 0.868	-90•	-320.		456			
000506	MAT1	8500	5.75E6	0.608	0.3	1.755-4			· · · · · · · · · · · · · · · · · · ·		
000507	\$			INTERE				N TN THE	SAME PLAN	NC.	٠. ا
000508	MPC	8700	870.t	1	1.0	8700	1	-1.0	JANE I CAL	VIE.	
000509	MPC	8700	8702	1	1.0	8700	1	-1.0			
000510	MPC	8700	8703	1	1.0	8700	1	-1.0			i
000511	MPC .	8700	8704	1	1.0	8700	1	-1.0			
000512	MPC	8700	8705	1	1.0	8700	1	-1.0			
000513	MPC	8700	8706	1	1.0	8700	1	-1.0			
000514	MPC	8700	8707	1	1.0	8700		-1.0			· · · · · · · · · · · · · · · · · · ·
000515 000516	MPC MPC	8700 8700	-8708 -8709	1	1.0	8700 8700	1	-1.0		n	: ;
000517	MPC	8700	8710	1	1.0 1.0	8700	. 1	-1.0 -1.0			
000517	MPC	8700	8711		1.0	8700 8700	- -	-1.0			
000519	MPC	8700	8701	2	1.0	8700	2	-1.0			•
000520	MPC	8700	8702	2	1.0	8700	2	-1.0			, •
000521	MPC	8709	8703	_2	1.0	8700	2	-1.0			
000522	MPC	8700	8704	2	1.0	8700 .	2	-1.0			; "
000523	MPC	8700	8705	2	1.0	8700	_2	-1.0	• • •		
000524	MPC	8700	8706	_2	1.0	8700	_2	-1.0			
000525	MPC	8700	8707	2	1.0	8700	2	-1.0	• •		
000526	MPC	8700	8708	2	1.0	8700	_2	-1.0			
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000531	MPC	8700	8702	3	1.0	8700	3	-1.0	•		
000532	MPC ·	8700	8703	3	1.0	8700	3	-1.0	•		
000533	MPC	8700	8704	3	1.0	8700	3	-1.0			
000534	MPC	8700	8705	3	1.0	8700	3	-1.0			
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000535	MPC	8700	8707	3	1.0	8700	3	-1.0	•		
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000537		MPC	8700	8708	3	1.0	8700	3	-1.0										. į
000538		MPC	8700	_8709	3	1.0	_8700	3	-1.0				•						<u>j</u>
000539		MPC	8700	8710	3	1.0	8700	3	-1.0					,		,			
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000033	MPC .	6062	6062	2	1.0	6061	2	-1.0	•					
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000050	MPC	7010	7010	4	1.0	6070		-1.0	-			•		
000051	MPC	7010	7010	5	1.0	6070	5	-1.0						
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000089 PL 000090 PL 000091 PL	OTEL	9003	30	3			•	•		٠.								j
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00009Z PL	OTEL	9020	8200	8050		9021	8050	8040	• ``		٠.							
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000096 5	•	CONC	FNTR	ATF	D MA.	< T .	r E M S								., .	•		•
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	NM2	9001	2050	2	0.15	28.82	17.6	-2.09										.
	IIM2	9002	5010		•037	-3.36	12.4	7.12	•	•						_		
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	NWS	9004	6060		0.98	2.42	-26.1	• 0		,		• •						. !
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000106 5			_NU221	"TO" EVT	NSION TAT	デオクしいだいデ					<u> </u>	<del> </del>			<u> </u>	<u> </u>		
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000109 +N		72.	-030 .	36.	• 0000	,	36.			NEA		·	•	-	•			
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000111 CO		3051	3050		0.668	-4.93	•			CS				•		•		
000112 +cs	5	328.		170.		• •	170•	.•					. 3.2	2			•	
000113			FLANGE"					,	<del></del>						·····	<del></del>		
000114 CO		3052	3050		1.08	2.07	2.			FLANG	Ε					,		
	NM2	594•		298•			298•											
000116 5	NM2 LANGE		AFT RIN	16													<del></del>	

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000117 000118	CONM2 +RING	2052 335•	2050	168•	0.40		168•		:	RING					•	
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000122 000123 000124	S CONM2 +BOLTS	3057 51.15	3050	TO PV BOL 25.65	•096	1.07	25.65	,		BOLTS		i.		•		
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000128 000129 000130	CONMS CONMS CONMS	5013 5014 5015	5010 5010 5010	8000 8000 8000	•0344 •0344 •0344	24.5 24.5 24.50	50. 70. 90.						•	,		; ;
000131 000132 000133	CONM2 CONM2 CONM2	5016 5017 5018	5010 5010 5010	8000 8000 8000	.0344 .0344 .0344	24.50 24.50 24.50	110. 130. 150.				· .					
000134 / 000135 000136	CONM2 CONM2	5019 50110 50111	5010 5010 5010	8000 8000 8000	.0344 .0344 .0344	24.50 24.50 24.50	170. 190. 210.		· · · · · · · · · · · · · · · · · · ·				/			1
000137 000138 000139	CONMS CONMS	50112 50113 50114	5010 5010 5010	8000 8000 8000	.0344 .0344 .0344	24.50 24.50 24.50	230 • 250 • 270 •		•						,	-
000140 000141 000142	COMMS COMMS	50115 50116 50117	5010 5010 5010	8000 8000 8000	.0344 .0344 .0344	24.50 24.50 24.50	290 • 310 • 330 •						•			!
000143 000144 000145 000146	CONM2 5 CONM2 +SHIECD	50118 6010	5010 SHIELD 6010	8000	.0344 25.06	24.50 1.67	350.	eridiyayi keriin e kadamadayidi danadaran		SHIELD		· · · · · · · · · · · · · · · · · · ·				-
000148 000147 000148 000149	S CONM2	6021	NDICE 6020	14957.	1.55 TUATORS		14957•							·		!
000150 000151 000152	CONM2 CONM2 COHM2	60801 61301 83001	6080 6130 8300	AC	0.24 0.24 0.24			· · · · · · · · · · · · · · · · · · ·	,	·.				·	<del></del>	
000153 000154 000155	SCONM2	84001 -4001	8400	SI	0.24 MPLE NSS 29.	5	· .					•		•		<u> </u>
000156 000157 000158	CONM2	4002 4003 *****	4002 4003	****	6.02 2.90 *****	*****	****	****	******	******			.0 .		·.	-
000159 000160 000161	\$ \$ 	COMPONE	ENT NO. 2		NOZZLE	EXTENSIO	N		·			· · · · · · · · · · · · · · · · · · ·				<u> </u>
000162 000163 000164	CBAR CBAR CBAR	2020 2040 2050	2020 2040 2050	2020 2040 2050	2000 2020 2040				•			·		· · · · · · · · · · · · · · · · · · ·		 
000165 000166 000167	GRID GRID GRID	2000 2020 2040		409•372 351•543 296•865		· · · · · · · · · · · · · · · · · · ·			, 			<u> </u>	1 1.3		<del></del>	
000168 000169 000170	GRID MAT1 PBAR	2050 100 2020	1.7E6 100	270.190 0.70E6 40.865	55550•	1.355E= 55550.	111100.									
000171 000172 000173		2040 2050 *******	100 100 ******	33.253 50.047 ******	30250. 25400. *****	30250. 25400. *******	60500. 50800. *****	•00445 •00445 *****	******	*********	· · · · · · · · · · · · · · · · · · ·					! i <del>  </del> !
000174 000175 000176	\$ \$	COMPONE	NT NO. 3	haddan , ear saine e e e ann an an an	NOZZLE		an a grant and a sale and				-			, 	<del></del>	-
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	000 <b>177</b> 000178	CBAR	3000	3000	3000	2050			•						•			•	ί
	00178	CBAR CBAR	3010 3020	3010	3010	3000		···	· · · · · · · · · · · · · · · · · · ·				·						·
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	00183	GRID	3000	0.,30	254.218	30 10													:
(	00184	GRID	3010		233.25				•				e.:						
	000185	GRID	3020		225.90											<del></del>			<del></del>
	000186	GRID	3030		220.491														:
	000187	GRID	3040		213.236						:								:
	000168	GRID	3050	***************************************	206 • 93						^ · · · · · · · · · · · · · · · · · · ·								
	000189	MAT1	347		11.4E6		7.394E-	4			: .					. •		•	į
	000190	PBAR	3000	347	11.5	3414.	3414.	6828	•007									·.	· i
	000191	PBAR	3010	347	32.3	4371.	4371.	8742.	•007										
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	000193	PBAR	3030	347	13.7	333.	_333•	666	007	·			·			·			·
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	000201	CELAS2	40012	9.4156	4001	2	3050	2	•			•						AT TO	,
	000202	CELAS2	40013	9.41E6	4001	3	3050	3	•							• •			į
	000203	CELASE	40021	334.E6	4002	- 1	4001							····		<del></del>	·····	<del>`</del>	
		CELAS2	40022	61.7E6	4002	2	4001	2						٠.					İ
	000205	CELAS2	40023	61.7E6	4002	3	4001	3	1				•	. •		1			ļ
	000206	CELAS2	40031	0.4856	4003	1	4002	1		~ <del></del>			<del></del>	<del></del>					
(	000207	CELAS2	40032	16.5E6	4003	2	4002	2			٠.				•				:
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	000209	GRID	4001		170.0	<del></del>		<del></del>	456				<del>`</del>			<del> </del>			
	000210	GRID	4002	•	129.0				456			•							Į.
	000211	GRID	4003		124.0				456	•		•			•	•			į
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	000216	CBAR	4000	4000	4000	3050			•					٠,		, л			
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	000223	GRID	4020		142.6925			•							•				ł
	000224	GRID	4025		124.67	· · ·	<del></del>	·				<del></del>							
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	000226	MAT1.	7075	10.3E6			2.616E-	tt.				•							, f
	000227	PBAR	4000			51600.			.0114	······································		<u> </u>							
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0002 <b>37</b> 000238	PBAR ****	5010	7075	290•28	64000.	64000.	12800.	•0545		****		,		•			•		1/
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000246	CHAR	6040	6040	6040	6030	,													i
000247	CBAR	6050	6050	6050	6040		<u> </u>			: .									1
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000249	CBAR	6070	6070	6070	6060	÷	٠ .	• •											1
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000252	GRID	6020		74.50		?									·				!
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000254	GRID	6040		57.0				······································								:	<del></del>		1
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000256	GRID	6060		$\frac{32.38}{0.000}$		······································	· · · · · · · · · · · · · · · · · · ·	·					·			<del></del>			4
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000259	GRID	6130	8000	25.0	215.0	39.50		23456							•	į			ł
000260	MATI	7039	10.1E6	3.78E6		2.56F-4					:					<del></del>		<del></del>	+
000261	PBAR (	6000	7039	11.94	2155.	2155.	4310.	•0282		•									1
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000263	PBAR	6050	7039	10.681	1543.	1543.	3087	• 02:82						-					-
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000265			/UJ9 (********		*****	**********		• U C O C ********	****	*****	*****	<del> </del>	<del></del>	<del></del>	<del></del>	<del></del>	<del></del>	<del>,</del>	-
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000268 000269 000270 000271 000272 000273 000274	\$ CBAR +7031 CBAR +7032 CBAR	7031	7031 4 7031	7030	7000		10.0	-10.0		7	031							,	
000268 000269 000270 000271 000272 000273 000274 000275	\$ CBAR +7031 CBAR +7032 CBAR +7033	7031 7032 7033	7031 4 7031 4 7031	7030 7030 7030	7000 7040 7010	0.0	10.0	-10.0 10.0 10.0	1 1 1	7 7	031 032 033		•						
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100297	CTRIA2	7144	8012	8030	8025	7040									
00298	CTRIA2	7145	8012	8021	8020	7040					٠٠.				
000299	CTRIA2	7146	8012	8020	8022	7040				,					
000300	CTRIA2	7147	8012	8022	8030	7040					•				
000301	CTRIA2	7148	8012	8030	8021	7040	•	•							4.
000302	GRID	7000		23.0	0.0	-10.25			<del></del>		,				
000303	GRID	7010		23.0	0.0	10.25						1			
000304	GRID	7020		23.0	-10.25					· · · · · · · · · · · · · · · · · · ·			<u>-</u>		
000305	GRIU	7030		23.0	0.0	0.0									
000306 00030 <b>7</b>	GRID MAT1	7040 250	24.0E6	23.0 9.24E6	10.25	0.0 7.33E-4								•	
00030 <u>7</u> 000308	PBAR	_233 _7031	250	3.0	10.0	10.0	20.0					<del></del>			
000309	5****	*****			.******	TO * O	~~U+U .	*****	***	*****	k sk		1 10 1		
000310	5 S	ar . n . n . An . n . d . ab.	· · · · · · · · · · · · · · · · · · ·	****	************		***	. <b></b>							
000311	<u>*</u>	COMPON	ENT NO. P		UPPER T	HRUST ST	RUCTURE				<del></del>			<del></del>	
000312	\$			•	J L							,		•	
000313	CBAR	8000	8000	8090	8000	8160	0	0	2		•		,	ı	
000314 /	CBAR	8001	8000	8001	8040	8110	0 .	0	2		• ;		. ,		
000315	CBAR	8002	8000	8170	8002	8110	0	0	2			•		•	
000316	CBAR	8010	8000	_8010	8050	_8160	_0	0	_2						
000317	CBAR	8021	8000	8021	8100	8140	0	0 .	2				T		
000318	CBAR	8022	8000	8050	8022	8140	0	0	2		-		- [		•
000319	CBAR	8030_	8000	8030	_8180	_8140	0	0	_2				_ <del></del>	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
000320	CBAR	8040	8000	8040	8020	8140	0	0	2		٠.		•		
000321	CBAR	8050	0008	8050	8210	.8160	0 :	0 .	2		4,11	;			
000322	CPARCNAR	8052	8000	8190	_8050	8140							<del></del>		<u> </u>
000323 000324	CBAR	8061	8170	8060	8080	-10.0	-10.	0.0	T	8061	•				
000324 000325	- +8061 Char	8065	8190	-3.4 8060	8030	-10.0	-3.4 -10.0	0.0	1	8065			• 3		•
000325	+8065	_0005	07.90	-2.5	-0000	-10.0	-2.5	0.0		8003	· · · · · · · · · · · · · · · · · · ·	<del></del>			
000323 000327	CHAR	8072	8000	8040	8070	8110	0	0	2						
000328	CBAR	8073	8170	B070	8060	-10.0	-10.	0.0	ī	8073			:		
000329	+8073			-3.4			-3.4					<del></del>		<u>-</u>	<del></del>
000330.	CBAR	8075	8190	8070	8060	-10.0	-10.0	0.0	1	8075	•				
000331	+8075			-2.5			-2.5		•	_			•		•
000332	CBAR	8081	000	8080	8040	8140	0	0	2	, '					
000333	CBAR	8085	8190	8080	8090	-10.0 .	-10.0	-10.0	1 '	8085					
000334	+8085			-2.5			-2.5	· · · · · · · · · · · · · · · · · · ·				4	. <u> </u>		
000335	CBAR	8095	8190	8060	8120	-10.0	-3.75	-14.0	1	8095					
000336	+8095	0405	24.22	-2.5		4.0.0	-2.5						. :1	٠.	
000337	CBAR	8105	8190	8100	8070	-10.0	10:	10.	<u> </u>	8105	<del></del>				
000338	+8105	.0105	0100	-2.5	0170	10. 0	<b>-2.5</b>		•	6105		• •			
000339 000340	CBAR +8125	8125	8190	8120 -2.5	8170	-10.0	3•75 −2•5	-14.0	1	8125			•		1
000340	CBAR	8155	8190		8100	-10.0	3.75	14.0	1	8155	<del></del>	<del> </del>	•		<del></del>
000341 000342	+8155	0133	0130	<b>~2.5</b>	0100	-2000	-2.5	T-4 + 0	-	9733		;			
000343	CBAR	8171	8170	8170	8090	-10.0	0.0	10.0	1 .	8171					
000344	+8171			-3.4			-3,4					_ +	<del></del>		
000345	CBAR	8175	8190	8170	8190	-10.0	10.0	-10.0	1	8175	•				
000346	+8175	•		-2.5	-		-2.5					. A Constitution			÷
000347	CBAR	8181	. 8170	8180	8100	-10.0	0.0	10.0	1	8181	`	1.			
000348	+8181			-3.4			-3.4								
000349	CBAR	8185	8190	8180	8150	-10.0	3.75	. 14.0	1	8185		<u> </u>			
000350	+8135			-2.5			-2.5	_							
000351	CBAR	8191	8170	8190	8200	-10.	10.	0 •	1	8191		9			
000352	+8191		المستحد المراجع المستحد	3.4		سعنت والزرارة للسو	-3.4				· · · · · · · · · · · · · · · · · · ·				
000353	CBAR	8195	8190	8190	8200	-1(1.0)	10.0	0.0	1	8195	١.	•		,	
000354 000355	+8195	0201	2170	-2.5 8200	0210	<b>~1</b> 0:	<del>-</del> 2.5	0.	•	8201		• •		•	
000355 000356 "	CBAR +8201	8201	8170	-3.4	8210	-10.	10.		1	4407					

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00035 <b>7</b> 000358	CBAR +8205	8205	8190	8200	8210	-10.0	10.0	0 • 0	1	8205			• •		į
000359	CBAR	8215	8190	-2.5 8210	8180	-10.0	10.	10.		8215	····	<del></del>	·	<del></del>	
000350	+8215	0213	01 70	-2.5	0.400	-10.0	-2.5	10.	4	OEIJ.		•			ì
000361	CODMEM	8006	8006	8040	8110.	8130	8001				•				i
003362	CQDMEM "	8011	8006	8050	8160	8130	8010	<del></del>	,			•			
000363	CODMEM	8043	8006	8040	8110	8140	8020								
000364	CODMEM	8192	8006	8050	8160	8140	8022								
003365	CROD	8041	8041	8040	8110	8051	8041	8050	8160		•	•			1
000366 000367	CROD CROD	8071 8111	8130 8130	8110	8070	8161	8130 8130	8190	8160 8180	•	•		•		. !
000368	CROD	-8130-	$-\frac{8130}{8130}$	<u>8110</u> 8090	8140 8130	_8140 8160	8130	8140 8130	8160		<del></del>	<del></del>	<del></del>	<del></del>	<del></del>
000369	CROD	8162	8130	8160	8140	8163	8130	8140	8100						1
000370	CROD	8171	8130	8170	8130	8131	8130	8130	8110				<i>i</i> .	• •	1.
000371	CROU	8210	8130	8160	8210	8110	8130	0308	8110				<del></del>		
00u372	CTRIA2	8001	8001	8000	8130	6090								•	
000373	CTRIA2	8002	8002	8005	8130	8000	···						:		
000374	CTRIA2	8003	8002	8005	8130	8010	9			•					1
000375	CTRIA2	8004	8001	8002	8130	8170 -							i		:
000376	CTRIA2_	_8005	8002	8005	8130	_8002		·	<del></del>	<del></del>	<del></del>	<del></del>			
000377 000378	CTRIA2	8007	8001	8040	8110	8070 8001						·	. [		!
000378	CTRIA2	8008 8012	8002 - 8012	8005 8000	8130 8001	8005							1		1
000379	CTRIAZ	-8012	8012	8001	<u>8010</u>	-8005 -				· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·		<del></del>		<del></del>
000381	CTRIA2	8014	8012	8010	8002	8005	the same			•					1
000382	CTRIA2	8015	8012	8002	8000	8005	•						•	: , ,	!
000383	CTRIA2	8026	3002	8025	8140	8020				·····	<del></del>				<del></del>
000384	. CTRIA2	8027	8002	8025	8140	8030	•					•			. '
000335	CTRIA2	8031	8001	8030	8140	8160		•		•					1
000386	CTRIA2	8032	8012	8021	8030	8025	· · · · · · · · · · · · · · · · · · ·						· · · · · · · · · · · · · · · · · · ·		
000387	CTRIA2	8033	8012	6030	8022	8025	***	i i					٠.		!
000388	CTRIAZ	8034	8012	8022	8020	8025	· · · · · · · · · · · · · · · · · · ·						· ·		
000389 000390	CTRIA2 CTRIA2	~8036~~ 8052	8012	8020	8021	8025		4					•		;
000391	CTRIA2	8088	8001 8001	8050 8040	8160 8110	8210 8080						:			j
000392	CTRIAZ	8121	8001	<del>8090</del> -	8120	8170	<del></del>	·	······································					· · · · · · · · · · · · · · · · · · ·	<del></del>
000393	CTRIA2	8151	8001	8100	8150	8180		ta,		•		No.			:
000394	CTRIA2	8191	8001	8050	8160	8190		No.			' . ·				!
000395	CTRIA2	8193	8002	8025	8140	8022	•		·····	<del></del>	· · · · · · · · · · · · · · · · · · ·				
000396	. CTRIA2	8194	8002	8025	8140	8021				•					ʻi
000397	CTRIA2	8195	8001	8021	8140	8100			•	•		·.	•		. !
000398	GRID	8000		17.0	-13.25			. ;							
000399	GRID	8001	•	17.0	-7.25	3.0				•		*			
000400	GRID	8002		17.0	-13.25	-3.0				·					
000401 000402	GRID	8005		17.0	-10,25									•	-
000403	GRID ( GRID	8010 8020		17.0 17.0	-7.25 7.25	-3.0 3.0			· .						1
000404	GRID	8021		17.0	13.25	-3.0			<del> </del>			<del></del>	<del> </del>		
000405	GRID	8022		17.0	7.25	-3.0		•			•				i i
000406	GRID .	8025		17.0	10.25	0.0				•	•				ł
000407	GRID	8030		17.0	13.25	-3.0			<del></del>	<del></del>	•			······································	<del></del>
000408	GRID	8040	•	17.0	0.0	10.25						•	i		. !
000409	GŖID	8050		17.0	0.0	-10.25		•			ė	•			!
000410	GRID	8060		0.0	0.0	24.25			· · · · · · · · · · · · · · · · · · ·				·····		+
000411	GRID	8070	8000	28.0	60.	0.0								•	
000412	GRID	8080	8000	28.0	120.	0.0									i
000413	GRID	" 8090" <del>"</del>	8000	28.0	150.	0.0									
000414 000415	GRID	8100	8000	28.0	30.	0.0									!
000415	GRID GRID	-8110 -5120	8000	0.0 28.0	0.0 180.	10.25	<del></del>				· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·			
000479	CRID	9150	.0000	£.() • U	±00 • ;	• 1)							:		

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000417	GRID	8130		0.0	-10.25	• 0	<b>V</b> . »								
000418	GRID	8140		0.0	10.25	•0	•								
000419	GRID	8150	8000	28.0	• 0	• 0		······································	· · · · · · · · · · · · · · · · · · ·						
000420	GRID	8169		0.0	• 0	-10.25					,				
000421	GRID	8170	8000	28.0	-150.	• 0								·	·
000422	GRIO	8180	8000	28.0	-30.	• 0						•			
000423 000424	GRID GRID	8190 8200	0003	28.0 0.0	-120• •0	•0 -24•25	,								
000425	GRID	-8210	8000	28.0	-60.	•0							····	····	
000426	GRID	8300	8000	25.0	215.0	0.0	0	23456						•	
000427	GRID	8400	8000	25.0	125.0	0.0	ŏ	23456					•		
000428	MATI	2024	10.5E6	4.0F.6		2.6E-4							····		<del></del>
000429	PBAR	8000	2024	1.17	•08	•26		1	,						
000430	PBAR	8170	2024	0.50	4.3	•0002	:					· · · · · · · · · · · · · · · · · · ·	· · ·	• •	
000431	PBAR	8190	2024	•8	2.36	2.36	3.55								
000432	PODMEM	8006	2024	0.10		•									
000433	PROU	8041	2024	0.35	·				<u> </u>					<del>/</del>	
000434 (	PROU	8130	2024	0.435			•	•		•				<i>!</i> :	•
000435	. PTRIA2	8001	2024	0.064								• • •	<i>j</i>	•	
000436	PTRIA2 PTRIA2	8002 	_2024 2024	_0.20_ -125	<del></del>		<del></del>		<del> </del>	<del></del>	<del></del>		<del>-</del>	<del></del>	<del></del>
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000445	CELAS2		1.1556	6130	1	8300	1				<del></del>		· · · ·		
000446	CELAS2		1.1556	6080	1	8400	1			٠.					
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000453	CONM2	9007	6061		1.97		•	_				er engel		٠.	•
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000455	CELAS2	606121	~2.0E+6	6061	2.	6070	2						:		
000456	CELVSS	606122	1.4E+6	6061	2	6040 .	2					٠.			
000457	CELAS2		2.0E+6	6061	3	6070	3		· · · · · · · · · · · · · · · · · · ·				·		
000458	CELAS2	006132	1.4E+6	6061	3	6040	3 (	•							
000459 000460	\$ \$		TPA	# 2				•							
000461	GRID	6062	8000	35.0	90•	43.		456		<del></del>			<del></del>		
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000463	CELAS2		2.0E+6	6062	ī	6070	1		•			•		•	
000464		606221			2	6070	2				<del></del>		<del></del>		
000465	CELAS2		1.4E+6	6062	²	60#0	2		7 -		7				•
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000469	<u> </u>				n'n on = ''' = '''	·	<del></del>	·		<del></del>		<del></del>		·	
000470	\$			EUS SU	PPORT FR	AME									
000471	\$ CELAS2	3055	3.5E+6	3050	•	3051	1	•		*NE	W			. •	
000472	CELAS2		3.5E+6		2	$-\frac{3051}{3051}$			<del></del>	*NE		<del></del>	·		
000474	CELAS2		3.5E+6	3050	3 .	3051	3			*NE			•		
000475	CELAS2		4.0E+7		4		-			*NF					
000476	CELAS2		3.5E+6		1	6001	1			*NE					
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000477 000478	CELAS2 CELAS2	6003	3.5E+6 3.5E+6	6000 6000	2	6001 6001	2 3				*NEW		<u>.</u> ·		
000479 000480 000431	CELAS2 CELAS2 CELAS2	8701 8702	4.05+7 1.E+6 1.E+6	6001 6001	4 1 2,						*NEW *NEW *NEW				
000482 000483 000484	CELAS2 COMM2 GRID	6001 3051	1.E+6 6001	6001 206• <b>63</b>	3 1•E+6		•	456			*NEW *NEW				,
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APPENDIX A

CASE 2

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	000029	MPCADD		6062	7000	7010	8300	8700				
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	000032	MPC	6062	6062	10 II A I	1.0	6061			·····		
	000033 .	MPC	6062	6062	7			7	-1.0			
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	000043	MPC	7000	7000	_6	1.0	6070	6	-1.0			
	000044	MPC	7010	7010	1	1.0	6070	1	-1.0		7010X	
	000045	+7010X		6070	5	-10.25		<i>⊒</i> *				
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	000049	+7010Z		6070	5	-6.0		<u> </u>				
	000050	MPC	7010	7010	4	1.0	6070	14	-1.0	* ;		
	000051	MPC	7010	7010	5 -	1.0	6070	5	-1.0		7	
	000052	MPC	7010	7010	6	1.0	6070	6	-1.0			i
		MPC	<b>"8300</b> "	6080	1	1.0	6050	1	-1.0		6080A	
	000054	+6080A		6050	5	-20.48	6050	6	-14.34			
	000055	MPC	8300	6130	1	1.0	_6050	1			6130A	
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	000065	+6DOFB	8110	8130	8140	4010									٠.			
	000066	OMIT1	456	2000	8170	2040	3000	8210	3020	8180	3DOFA					•		
	000067	+3D0FA_	_8190	4000	8150	4020	8200	4030	5000	6000 8040	3DOFB 3DOFC			<del></del>				
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	000104 000105		7000		CT SUBSY		<b>4</b> • Dn	21.0	U • U · .				·		•		٠.	
	000106	\$ \$	·	PESINU	CI 20021	1 3 1 L M			•			,			ر يالمنجم	• • •		
	000107	<del></del> \$		N0771_f	TOFYT	NSION AT	TACHMENT				•	<del></del>						
	000108	CONM2	2051	2050	I U LAIL	•0855	, / · O      · · · · ·   1   1				NEA							
	000109	+NEA	72.		36.	= 3.50.0		36.		•		•						
	000110	5		CORE-S								<del> </del>		<del>~~~~~~</del>	<del></del>	<del></del>		<del></del>
	000111	CONM2	3051	3050		0.668	-4.93		• •		cs		•	•				
	000112	+cs	328.		170•	*		170.	•	•			٠.					
	000113	<del></del> 5 ·		FLANGE										<u> </u>			<del> </del>	
	000114	CONMS	3052	3050		1.08	2.07				FLANG	E .						
	000115	+FLANGE	594•		298•			298•										
	000116	\$		AFT RI	NG.						1							

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000117 000118	CONM2 +RING	2052 335•	2050	168.	0.40	,	160		•		RING	,				, , ,	<del></del>
000119 000120 000121	\$ CONM2	2053	TORUS 2050		0.198	-3.11	168.				TORUS		<u> </u>				
000122	+TORUS	181.	NOZZLE	91. TO PV BO	LTS		91.	<del></del>									
000123 000124	+BOLTS	3057 51.15	3050	25.65	•096	1.07	05.65				ROLTS	٠				•	ľ
000125	-, -, -, -, -, -, -, -, -, -, -, -, -, -		CONTRO	DRUM AC	TÜNTORG	7101	25.65	·		<u> </u>		, ' '	1 44 ±4				!
000126	CONM2	5011	5010	8000	•0344	24.5	10.		•								· i
000127	CONM2	5012	5010	8000	•0344	24.5	30.			•		••					
000128	COW 2	5013	5010	0008	.0344	24.5	50.	<del></del>						<del></del>		· · · · · · · · · · · · · · · · · · ·	
000129	CONM2	5014	5010	8000	.0344	24.5	70.										. [
000130	CONM2	_5015	5010	8000	.0344	24.50	90•							• • • • • • • • • • • • • • • • • • • •			!
000131	CONM2	5016	5010	0008	.0344	24.50	110.		<del></del> -		<del></del>	<del></del>	····	· · · · · · · · · · · · · · · · · · ·			<del></del>
000132 000133	CONM2	5017	5010	8000	•0344	24.50	130.			٠.	:					•	- 1
000133	_CONM2	_5018	5010	80C0	.0344	24.50	150•			• ,							į
000135	CONM2	5019	5010	8000	• 0344	24.50	170.					· · ·		- · · · · · · · · · · · · · · · · · · ·	7	·	+
000135	CONM2	5011 <b>0</b> 50111	5010	8000	.0344	24.50	190.		(.						<i>:</i>		
000137	CONM2	-50112	5010 5010	8000	0344	24.50	_210•	• '						•	4	•	
000138	CONM2	50113	5010	0008	• 0344	24.50	230.								<del>-</del>		
000139	CONM2	50114	5010	8000 8000	• 0344	24.50	250•		1		·	. • •			İ		i
000140	CONM2	50115	5010		0344	_24.50	270•	`					·		;		
000141	CODM2	50116	5010	8000 8000	•0344 •0344	24.50	290								!		<del>- 1</del>
000142	CONM2	50117	5010	8000	• 0344 • 0344	24.50 24.50	310.			• .;							!
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000144 .	\$		SHIELD	0000	• 0.54+	24.00	350•										
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000147	\$		NDICE									: '	•	i			. !
000148	CONMS	6021	6020		1.55		* *				-						İ
000149	-5			AC	TUATORS	<del></del>		<del></del>	<del></del>		<del></del>		· · · · · · · · · · · · · · · · · · ·	<del>`</del>			
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000151	CONNS	61301	6130		0.24			•					·			•	
000152	CONMS	83091	8300		0.24	·		<del></del>	······································	<del></del>	. (				<del></del>		<del></del>
000153	CONM2	84001	8400		0.24			2*									I
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000315	CBAR	8010	8000	8010	8050	8160	0	. 0	2 .		$(-1)^{-1} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{ij} A_{i$	. 1
000317	CBAR	-8021	8000	8021	8100	8140	0		2	<del></del>		
000318	CBAR	8022	8000	8050	8022	8140	Ö	0	2	•		i
000319	CBAR	8030	8000	8030	8180	8140	Ŏ.	ŏ	ž	•		İ
000320	CBAR	8040	8000	8040	8020	8140	ō		2			<del>i</del>
000321	CBAR	8050	8000	8050	8210	8160	Ô	Õ	2			. !
000322	CBAR	8052	8000	8190	8050	8140	Ö	o ·	2			[
000323	CBAR	8061	8170	8060	8080	-10.0	-10.	0.0	1	8061		<del></del>
000324	+8061			-3.4			-3.4					
000325	CBAR	8065	8190	8060	8080	-10.0	-10.0	0.0	1	8065		· i
000326	+8065			-2.5			-2.5					T
0uu32 <b>7</b>	CBAR	6072	8000	8040	8070	8110	0	0	2.			ļ.
000328	CHAR	8073	8170	8070	8060	-10.0	-10.	0.0	1	8073		. <u>. l</u>
00υ329	¥807 <b>3</b>			-3.4			-3.4					
000330	CBAR	8075	8190	8070	. 8060	-10.0	-10.0	0.0	1	8075		
000331	+8075			-2.5			-2.5					<u> </u>
000332	CBAR	8081	8000	8080	8040	8140	0	0	2	0005		1
000333	CBAR	8085	8190	8080	8090	-10.0	-10.0	-10.0	1	8085		11
000334	+8085			-2.5			-2.5					<del></del>
000335 000336	CBAR +8095	8095	8190	8090 -2.5	8120	-10.0	-3.75 -2.5	-14.0	1	8095		, l-
000337	CBAR	8105	8190	8100	8070	-10.0	-10.	10.	1	ክ105		!
000338	+8105		01.90	-2.5	- 6070	1000	-2.5			6,103		<del></del>
000339	CBAR	8125	8190	8120	8170	-10.0	.3.75	-14.0	1	8125		· i
000340	+8125	OLES	.0190	<del>-</del> 2.5	0270	10.0	-2.5	1440	•	0127		!
000341	CBAR	8155	8190	8150	8100	-10.0	-3.75	14.0	1	8155		
000342	+8155			-2.5			-2.5					!
000343	CBAR	8171	8170	8170	8090	-10.0	0.0	10.0	1 .	8171		1
000344	+8171			-3.4		·	-3.4					<del></del>
000345	CBAR	8175	8190	8170	8190	-10.0	10.0	-10.0	1	8175		- ;
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000347	CHAR	8181	. 8170	8180	8100	-10.0	0.0	10.0	1	8181		<u> </u>
000348	+8181		•	-3.4			-3.4	•				i
000349	CBAR	8185	8190	8180	8150	-10.0	3.75	. 14.0	1	8185		
000350	+8165			-2.5		_	-2.5					1
000351	CBAR	8191	8170	8190	8200	-10.	10.	0•	1	8191		·j
000352	+8191			-3.4			-3.4					
000353	CBAR-	8195	8190	8190	8200	-10.0	-10.0-	0.0	T	8195		
000354	+8195	0001	0170	-2.5	u010	_10	<del>-</del> 2.5	0	•	0001		1
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000357 000358	CBAR +8205	8205	8190	8200 <del>-</del> 2•5	8210	-10.0	10.0	0.0	1	8205	•				• .	
000359	CBAR	8215	8190	8210	8180	-10.0	10.	10.		8215		<del></del>			,	
000360	+8215			-2.5	0200		-2.5		-	. 0						
000361	CODMEM	8006	8006	8040	8110.	8130	8001								•	
000362	CODMEM	8011	6003	8050	8160	8130	8010					;				<del></del>
000363	CODMEM	8043	8006	8040	8110	8140	8020			•	•		٠			
000364	CGDMEM	8192	8006	8050	8160	8140	8022	·				<u> </u>	, + 1 1			
000365	CROD	8041	8041	8040	8110	8051	8041	8050	8160						•	
000366 000367	CROD	8071	8130	8110	8070	8161	8130	8190	8160	:					•	
000368	CROD CROD	-8111 - 8130	8130 8130	<u>8110</u> 8090	8140 8130	8140 8160	8130 8130	8140 8130	8180_ 8160			· · · · · · · · ·	,		<del> </del>	
000369	CROD	8162	8130	8160	8140	8163	8130	8140	8100	•••		•		*	•	
000370	CROD	8171	8130	8170	8130	8131	8130	8130	8110			Y	`	,		
000371	CROD	8210	8130 <del>-</del> -	8160	8210	-8110-	8130	8080-	8110			· · · · · · · · · · · · · · · · · · ·	<del></del>			
000372	CTRIA2	8001	8001	8000	8130	8000	0200	000,0	()223		•				•	
000373	CTRIA2	8002	8002	8005	8130	8000		:								
000374	CTRIA2	8003	8002	8005	8130	8010	<del></del>		<del></del>		<del></del>			7	<del> </del>	
000375	CTRIA2	8004	8001	8002	8130	8170	•		r			•		;		
000376	CTRIA2	8005	8002	8005	8130	8008					<u> </u>				<u> </u>	
000377	CTRIA2	8007	8001	8040	8110	8070							·	$\neg$		
000378	CTRIA2	8008	8002	.8005	. 8130	8001	*		•					: 1		
000379	CTRIA2	8012	8012_	8000	8001	8005				<u> </u>		. ·		· .	<del>,</del>	
000380	CTRIA2	8013	8012	1 208	8010	8005		· .								
000381	CTRIA2	8014	8012	8010	8002	8005		• •	•	1.34				· ·		
000382	CTRIA2	8015	8012_	8002	8000_	8005		<u> </u>		3				· · · · · · · · · · · · · · · · · · ·		<u> </u>
000383	CTRIA2	8025	8002	8025	8140	8020			• *					*		
000384	- CTRIA2	8027	8002	8025	8140	8030		T 1		• •					٠,	
000395	CTRIA2	8031	8001	8030	8140	8180			,			······································	<del></del>	<del></del>		
000386 000387	CTRIA2 CTRIA2	8032 8033	8012 8012	8021 8030	8030 8022	8025	٠.			i d						
000387	CTRIA2	8034	8012	8022	8020	8025 8025	• '	•	•					. ' '	•	
000389	CTRIA2	8034 8036	-8012	-8020	8021	8025		<del> </del>	<del>,</del>				·			<del></del>
000390	CTRIA2	8052	8001	8050	8160	8210										
000391	CTRIA2	8082	8001	8040	8110	8080						• •				
000392	CTRIA2	8121	8001	8000	8120	8170		<del></del>				5.75	;	<del>,                                    </del>	······································	
000393	CTRIA2	8151	8001	8109	8150	8180	ers in the con-							:		
000394	CTRIA2	8191	8001	8050.	8160	8190		•					. :		,	
000395	CTRIA2	8193	8002	8025	8140	8022										·,
000396	CTRIA2	8194	8008	8025	8140	8021	•	·								
000397	CTRIA2	8195	8001	8021	3140	8100										
000398	GRID	8000		17.0	-13.25	3.0		•	•		14 11 1					
000399	GRID	8001		17.0	<del>-</del> 7.25	3.0				•		٠.	•		•	
000400	GRID	8002		17.0	-13.25	_ <del>_</del> 3 <u>.0</u>	······································	·		· · · · · · · · · · · · · · · · · · ·			<del></del>			
003401	GRID	8005		17.0	-10.25		*. 2	•	• • •		2.3	•				
000402 000403	GRID GRID	8010 8020	• •	17.0 17.0	7.25 7.25	-3.0 -3.0					i .	•		:		
000403	GRID	-8020 8021	- <del></del>	$-\frac{17.0}{17.0}$	13.25	3.0 _3.0	<del></del>	<del></del>	·				······································			<del></del>
000404	GRID	8022		17.0	7.25	-3.0		•	•	V	•				• •	
000405	GRID .	8025	•	17.0	10.25	0.0	100						والمراجعين فيافضوا			
000407	GRID	-8030-		i7.0	13.25	-3.0		<del></del>		<del> </del>						
000408	GRID	8040		. 17.0	0.0	10.25						<i>;</i> .	•			
000409	GRID	8050		17.0	0.0	-10.25									• .	
000410	GRID	-8060	·	0.0	0.0	24.25	<del></del>	·		······					·	
000411	GRID	8070	8000	28.0	60.	0.0				•						
000412	GRID	8080	8000	28.0	120.	0.0		1	•					• • •		
000413	GRID	8090	0003	28.0	150.	0.0			• • •	·	1   1					
000414	GRID	8100	8000	28.0	30.	0.0	•				•	1				
000415	GRID	8110		0.0	0.0	10.25		!			·	·			······	
000416	GRID	8120 <u>.                                  </u>	8000	28.0	180.	• 0										

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000417	GRID 8130	0 .	0.0	-10.25	•0									1
000418 .	GR1D 8140		0.0	10.25	• 0					• .				1
000419	GRID 815	0 8000	28.0	• 0	• 0			·						
000420 .	GRID 816	0	. 0.0	• 0	-10.25	,	•						•	!
000421	GRID 817	0 8000	28.0	-150.	• 0	* *								!
000422	GRID 818		28.0	-30.	• 0	·····						······································		<del></del>
000423	GRID 819		28.0	-120.	• 0	•	•							1
000424	_GRID820		0.0	•0	-24 • 25									
000425	GRID 821		28.0	-60•	• 0									
000426	GRID 830		25.0	215.0	0.0 .	0	23456	1		• •				1
00042 <u>7</u> 000428	GRID840	**************************************	25.0	_125.0_	0 • 0	0	23456							
000428	MAT1 202		4.0E6	0.0	2.6E-4								•	
000429	PBAR 800 PBAR 817		1.17 0.50	•08 4•3	•26 •0002			•		•	•			1
000431	PBAR 819		•8	2.36	2.36	3.55					· · · · · · · · · · · · · · · · · · ·		·	
000432	PODMEM 800		0.10	2.50	, 2.00	2433					•			i L
000433	PROD 804		0.35				•					,		i
000434	PROD 813		0.435			<del></del>				<del></del>		<del></del>		<del></del>
000435	PTRIA2 800		0.064				· .				•	<i>;</i>		.
000436	PTRIA2 800		0.20											. !
000437	PTRIA2 801	2 2024	•125					<del></del>			<del></del>		··	<del>+</del>
000438	5******** <b>*</b>	*****	*****	******	****	****	******	*****	*****	:		1		
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000447	CELAS2 840			1	8300 8400	1			•					- 1
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00(1452	5	T P A	#1					<del></del>	1	<del></del>	<del></del>	·		<del></del>
000453	GRID 606		35.0	-90.	43.		456							į
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000456	CELAS2 606		6061	2	6070	2	•			•	,			
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000458 000459	CELAS2 606 CELAS2 606	131 2.0E+6 132 1.4E+6		3	6070 6040	3						-		. !
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000461	- S	TPA	#-2				<del></del>	<del></del>	<del></del>	<u>.</u>	<u> </u>			<del></del> 1.
000462	GRID 606		35.0	90•	43.		456							ĺ
000463	CONM2 900			1.97			, 50				•	•		i
000464	CELAS2 606		6062	- 1	6070	1			<del></del>	<del></del>		· · · · · · · · · · · · · · · · · · ·		
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000466	CELAS2 606	222 1.4E+6	6062	2	6040	2					a sa saka sa			į
000467	CELAS2 606	231 2.0E+6	<del>6062</del>	3	6070	3 .			<del></del>			*******		
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000472	\$ <del>-</del> CC! AC2305!												<u> </u>	
000473	CELAS2 305			1	3051	1				*NEW				
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000475	CELAS2 305			- ₄	JU5 L.				·	*NEW	<del></del>			
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000477 000478	CELAS2 CELAS2	6001 6002	3.5E+6 3.5E+6	6000 6000	1 2	6001 6001	1 2	, ,			*NEW		. *	
000479 000480 000481	CELAS2 CELAS2 CELAS2	6003 6004 8701	3.5E+6 4.0E+7 1.E+6	6000 6000 6001	3 4 1	6001	3	·	÷.		*NEW *NEW *NEW	•	<del></del>	
000482 000483 000484	CELAS2 CELAS2 CONM2	8702 8703 6001	1.E+6 1.E+6 6001	6001 6001	2 3 1.E+6						*NEW *NEW *NEW			
000485 000486 00048 <b>7</b>	GRID GRID MPC	3051 6001 8700	3051	206.63 98. 1	1.0	6001	1 .	456 456 -1.0			*NEW *NEW *NEW			·
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APPENDIX A

CASE 7

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000004	\$	COORDI	NATE SYSTEM DEFI	NITTONS						
000005		COOKBI	MAIL 313) LM DC/ 1					<u>.</u>	<del> </del>	<u>.</u>
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000007	+BC 300.0		•0 •0 ,	300•	• 0	•0	BC .	·		
000007	CORD2C 8000	0.0	0.0 0.0	1000.0			CYL	<del></del>		· · · · · · · · · · · · · · · · · · ·
000000	+CYL 1000.		0.0	1000.0	0.0	0.0	CIL			
000010	5*********	.0 1000.0 0.0 ********	والمراجعة المراجعة والمراجعة والمراجعة والمراجعة والمراجعة والمراجعة والمراجعة والمراجعة والمراجعة والمراجعة	· ·*******	ر باد داد رد. داد رد. داد داد رد.	المراقع الماريف الماريف الماريف الماريف	بطريقة بقريفة بقريفة يقريف	•		
000011		**************************************		*****	****	* * * * * * * * * * * * * * * * * * *	********	*	<del></del>	<del></del>
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000013	\$					· · · · · · · · · · · · · · · · · · ·			······································	;
000014 7		******	******	******	*****	******	******	*		•
000015	\$								S 1	ļ.
.000016	\$	EIGENV	ALUE EXTRACTION			·			·	+
000017	\$								1	1
000018	EIGR 25	GIV		25		1.E-6	GIV25		- 1	:
000019	+GIV25 MAX								. F .	
000080	5*******	********	******	*****	******	*****	*****	*		!
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000022	\$	SINGLE	-POINT CONSTRAIN	IT SETS						i i
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000024	SPC1 10	123456 8700								!
000025	S********	*******	******	****	*****	*****	*****	*		!
000026	s				·····					<del>i</del>
00002 <b>7</b>	\$		MULTI-POINT CONS	TRAINTS				•	•	
000028	\$				•					
000029	MPCADD 10	6062 7000	7010 8300	8500	8700			*NEW	<del></del>	<u></u>
000030	<b>5</b> .					•	٠.	*NEW		
000031	\$ N	MPC TPA #2 TO TPA	#1		•			*NEW	٠,	
000032	MPC 6062	6062 1	1.0 6061	1	-1.0	<del></del>		*NEW	· ` ` · · · · · · · · · · · · · · · · ·	
000033	MPC 6062	6062 2	1.0 6061	2	-1.0		,	*NEW		
000034	MPC 6062	6062 3	1.0 6061	3	-1.0			*NEW		i i
000035	MPC 7000	7000 1	1.0 6070	<del></del>	-1.0	<del> </del>	7000X	**=1	<del></del>	<del>i</del> .
000036	+7000X	6070 5	10.25	-			ioook	· · · · · · · · · · · · · · · · · · ·	. • •	
000037	MPC 7000	7000 2	1.0 6070	2	-1.0	•	7000Y		•	1
000038	+7000Y	6070 4	-10.25 6070	6 .	6.0		70001			
000039	MPC 7000	7000 3	1.0 6070	3	-1.0		7000Z	•		
000000	+7000Z	6070 5	<del>-</del> 6.0	<b>.</b>	-1.0		10002			
003041	MPC 7000	7000 4	1.0 6070	·····	-1.0	<u> </u>		<u> </u>	· · · · · · · · · · · · · · · · · · ·	·
000042	MPC 7000	7000 5	1.0 6070	5						. !
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000047	+7010Y	6070 4	10.25 6070	- 6	6.0				,	1
000048	MPC 7010	7010 3	1.0 6070	3 .	-1.0		7010Z	•		i
000049	+7010Z	6070 5	-6.0	<u>,</u>				<u> </u>		· i
000050	MPC 7010	7010 4	1.0 6070	4	-1.0		-			
000051	MPC 7010	7010 5	1.0 6070	5	-1.0	•	•		•	
000052	MPC 7010	7010 6	1.0 6070	6 .	-1.0					. 1
000053	MPC 8300	6080 1	1.0 6050	1	-1.0		6080A		<del></del>	
000054	+6080A	6050 5	-20.48 6050	6	-14.34			. * .		1
000055	MPC 8300	6130 1	1.0 6050	1	-1.0		6130A	•		!
000056	+6130A	6050 5	14.34 6050	6	-20.48			!		
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000057	MPC	8300	8300	1	1.0	8170	1	-1.0			•				
000058	MPC	8300	8400	ī	1.0	8080	ī	-1.0	1		• :		·		1
000059	5*****	****	*****	*****	****	*****	*****		*****	******	k	<del></del>	<del></del>		<del>-</del>
000060	\$														i i
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00 1065	\$				·					······································	·			<del>`</del>	<del></del>
000063	OMIT1	123456	2020	3010	3030	3040	4025	8000	8001	6DOFA		•			1
000064	+6D0FA	8002	8005	8010	8020	. 8021	8022	8160	8030	6DOFB		**			1
00u065	_+6D0FB_	8110	8130	8140	4010										
000066	OMIT1	456	2000	8170	2040	3000	8210	3020	8180.	3DOFA				·	. [
000067	+300FA	_8190	4000	_8150	4020	8200	4030	5000	6000	300FB					i
000068	+3DOFB	6020	6030	6040.	6070	7020	7030	7040	8040	3DOFC			1,7		
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000070		***	*****	*****	*****	******	*******	****	*****	*****					
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000075	5*****	*****	*****	*****	******	*****	*****	*****	******	*****	<b>.</b>		$x = x \cdot T$	,	i
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000078	§ GRID	•		W 77 O				407456	•				1	•	
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000081	GRID	3		•	50.	<b>5</b> 0		123456						•	l I
000031	GRID	10		420•		50.	•	123456	· ;				•		1
000083	GRID	20		420.	40.		<del></del>	123456_			<del> </del>				
000084	GRID .	30			40.	40.		123456		•			: .		. 1
000004	PLOTEL	9001	10	1		40 •	•	123456		-		rational designation of the second	13		1
000086	-PLOTEL	9002	20	_ <u>\$</u>			<del></del>	<del></del>			<del></del>		<del></del>		<del></del>
000087	PLOTEL	9003	30	3											•
000038	PLOTEL	9010	8120	8005		9011	80.05	8025		•	٠.				,
000089	-PLOTEL-	9012	8025	8150		9013	8150	8140		·	<del></del>	<del> </del>		·····	
00000	PLOTEL	9014	8140	8130	•	9015	8130	8120		· · · ·					į
000091	PLOTEL	9020	8200	8050		9021	8050	8040							i
000092	PLOTEL	9022	8040	8060	<del></del>	9023	8060	8110	·····	<del></del>		<del></del>	<del></del>		
000093	PLOTEL	9024	8110	8160		9025	8160	8200		•			V		. !
000094	5 * * * * *	*****	******	*****	*****	******	*****	****	*****	*****				; '	
000095	<b></b> \$		<del></del>	<del></del>			·· ,··				<del></del>				
000096	5	CONC	ENTR	RATE	D MAS	SS II	rems			• •			, н		
000097	\$	•								•					i
000098	5			PF				•							1
000099	CONM2	9001	2050	2	0.15	28.82	17.6	-2.09				•			. !
000100	CONM2	9002	5010		•037	-3.36	12.4	7 • 1.2						•	
000101	CONM2	9003	5010		1.19	-2.82	• 0	• 0							
000102	CONM2	9004	6060		0.98	2.42	-26 • 1	• 0	ā.					•	i .
000103	_CONM2	9005	6050		86	-1.5	26.5	14.5	·			,			
000104	CONM2	9006	6050		0.92	4.50	27.5	0.0							
000105	\$	·	DESTRUC	T SUBSY	STEM		•							•	
000106 000107	<u> </u>		<b></b>	TA	NCTON 'AT-	-A				· · · · · · · · · · · · · · · · · · ·		et it is in the expension in the	. , 4	. 1	
000107	•	2051		IO EXIE	NSION AT	ACHMENT		•		4154					ļ
000108	CONM2 .	2051 72.	2050	36.	• 0855		36•	•		NEA				•	1
000110	5 NEA		CORE SU				J0•	. •	<del></del>		- <del></del> -				
000111	CONM2	3051	3050	WE OK I	0.469	-4.93		•		cs	• •			•	į
000111	+CS	328•	<b>3</b> 030	170•	0.668	-4.73	170•	• .		ÇS					İ
-000112	<del>_</del> \$		FLANGE				1/00								
000114	CONM2	3052	3050		1.08	2.07				FLANGE	* :.				!
000115	+FLANGE		2000	298•	2.00		298•			FLANGE			-		, 1
000116	_ frenivor		TAFT RIN						<del></del>			<del></del>			
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000117 000118	CONM2 +RING	2052 335•	2050	168•	0.40		168•			RING					•	
000119	5		TORUS			<del></del>		<del></del>						· · · · · · · · · · · · · · · · · · ·		
000120	CONM2	2053	2050		0.198	-3.11			•	TORUS						
000121	+TORUS	181.		91.	,		91.									
000122	5		NOZZLE	TO PV BOL	TS									٠.		
000123	CONM2	3057	3050		•096	1.07				BOLTS	•	!		•		
000124	+BOLTS	51.15		25.65			25.65				: ' .	<u> </u>				
000125	5		CONTROL			(18)										
000126	CONM2	5011	5010	8000	• 0344	24.5	10.									
000127	CONM2_	_5012	5010	_8000	•0344	24.5	30		·							
000128	CONMS	5013	5010	8000	•0344	24.5	50•					•				
000129	CONM2	5014	5010	8000	• 0344	24.5	70 •	. •	:							
000130	CONM2	5015	5010	_8000	.0344	24.50	90.		·	<del> </del>						
000131	CONM2	5016	5010	8000	•0344	24.50	110.						•			
000132	CONM2	5017	5010	8000	.0344	24.50	130.			٠,						
000133	CONMS	$-5018_{-}$	5010	8000	•0344 •0344	24.50 24.50	150 • 170 • ·		·			<del></del>	· · · · · · · · · · · · · · · · · · ·	<del></del>		
000134	CONM2	5019 50110	5010	8000 8000	•0344	24.50	190.					,		í		
000135 000136	CONM2	50110	5010 5010	8000 8000	•0344	24.50	210			•				-	i	
000137	CONMS	_50112	5010	8000	0344	24.50	230				<del></del>	<del></del>				
000137	CONM2	50113	5010	.8000	.0344	24.50	250•							1		
000139	CONM2	50114	5010	8000	.0344	24.50	270•							` [		
000140	CONME	50115	5010	8000	0344	24.50	290•				· · · · · · · · · · · · · · · · · · ·					
000141	CONM2	50116	5010	8000	.0344	24.50	310.	ė		*.	*.				•	
000142	CONMS	50117	5010	8000	.0344	24.50	330.				•		. •	• •		
060143	CONM2	50118	5010	8000	.0344	24.50	350•					<del></del>			<del> </del>	
000144	\$		SHIELD			•										
000145	CONM2	6010	6010		25.06	1.67				SHIELD	) 1	•		,		
000146	+SHIELD	29743.		14957.	*****		14957.	***************************************	A							
000147	\$	•	NDICE	*								.•	•	٠,		
000148	CONM2	6021	6020		1.55											
000149	<u>s</u>			YC.	TUATORS											
000150	CONM2	60801	6080		0.24	:				•						
000151	CONM2	61301	6130		0.24								· · · · · · · · · · · · · · · · · · ·			· · · · · · · · · · · · · · · · · · ·
000152	CONM2	83001	8300		0.24	•				٠		.~				
000153	CONIAS	84001.	8400		0.24											•
000154	5			SI	MPLE NSS	<u> </u>	·	<del></del>	_ <del></del>	<u> </u>		• •				
000155	CONN2	4001	4001		6.02	•	•			• , •	•			:		•
000156 000157	. CONM2 CONM2	4002 4003	4002 4003		2.90				•	•	• •		. •		•	
000158	CONNE	4000						****		*****	**			<del></del>		
000159	\$		****		***	in the state of the state of	to an array of the street of the street	A		•	•	*	· · · ·		•	•
000160	<b>5</b>	COMPONE	ENT NO. 2		NO27LF	EXTENSI	ρŃ									
000161	<u> </u>			<del>-</del>				······································			<del></del>	·	<del></del>			
000162	CBAR .	2020	2020	2020	2000										•	
000163	CBAR	2040	2040	2040	2020	•								•	•	
000164	CBAR	2050	2050	2050	2040		_ <del></del>	·					<del></del>			
000165	GRID	2000	<del></del>	409.372			_				•	•		•		
900166	GRID .	2020		351.543		•			*		• • •	1		, **		
000167	GRID	2040		296 • 865							<del></del>				····	
000168	GRID	2050		270.190						•	•			. •		•
000169	MATI	100	1.7E6	0.70E6		1.355E									:	
000170	PBAR	2020	100	40.865								· · · ·				
000171	PBAR	2040	100	33.253	30250.	30250.	60500.	.00445	•							
000172	PBAR	2050	100	50.047	25400.	25400.	50800.	•00445								
000173	5*****	****	******	*****	****	****	*****	****	******	*****	**					
	35															
000174				-												
000174 000175 000176	3	COMPONE	ENT NO. 3	<u> </u>	NOZZLE			-								

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000177	CBAR	3000	3000	3000	2050					•										
000178	CHAR	3010	3010	3010	3000								٠.	,				٠.	•	ì
000179	CBAR	3020	3020	3020	3010						·		·	<del></del> -				···		
000180	CBAR	3030	3030	3030	3020					•										
000181	CBAR	3040	3040	3040	3030		•									•				1
000182	CBAR	3050	3050	3050	3040			<del></del>						•	<del></del>	······································		· · · · · · · · · · · · · · · · · · ·	<del></del>	-
000183	GRID	3000		254 • 218			•							į						i
000184 000185	GRID	3010		233 • 25				<u> </u>										·· <del>-</del>		i
000185	GRID GRID	3020 3030		225 90												•				į
000187	GRID	3040		220 • 491 213 • 236	1	•				:			•							i
000188	GR1D	3050		206.93			· **-						<del> </del>		<del></del>	·				
000189	MAT1	347	29.3E6	11.486		7.394E-	4 .		•						•					. !
000190	PBAR	3000	347	11.5	3414.	3414.	6828	.007	¢							•				ŧ
000191	PBAR	3010	347	32.3	4371.	4371.	8742.	•007	··				<del></del>						<del></del>	-+
000192	PBAR	3020	347	16.3	567.	567.	1133.	.007	•				*					•		i
000193	_PBAR	3030	347	13.7	333.	_333•	_666•	•007		· ·										
000194	PBAR	3040	347	25.2	2070•	2070.	4140	•007				,					į			
000195 000196	PBAR ******	3050	347	82.2	16170.	16170	32340.	•007						. '			$\cdot j$			į
000197		***	****	****	*****	*****	*****	*****	*****	****	*****	**	<u> </u>		<del>_`</del>		<del></del>		·	_i
000198	<b>S</b>	NUCLEAR	SUBSYST	FM :	SIMPLE	MODEL											1			. !
000199	\$	ocae,	3003131	1.017	OTHI CE	MODEL						•					İ	•	•	!
000200	CELAS2	40011	41.8E6	4001	1	3050	1						<del></del>				<del></del>		<del></del>	
000201	CELAS2	40012	9.41E6	4001	2	3050	2	•		, .										
000202	CELAS2	40013	9.41E6	4001	. 3	3050	3 .									• :		13.		,
000203	CELAS2	40021	334 • E6	4002	1	4001	1													
000204	CELAS2	40022	61.7E6	4002	2	4001	2	٠.		•								•		
000205	CELAS2	40023	61.7E6	4002	3	4001	3			1						<u>',                                     </u>	<u> </u>			. !
000206	CELAS2	40031 40032	0.48E6 16.5E6	4003	1	4002	1	•					1		:					i
000208	CELAS2	40033	16.556	4003 4003	2 3	4002 4002	2													i
000209	GRID	4001	10.00	170.0		4002		456		·			<del></del>		<del>.</del>	<u> </u>	<del> </del>			!
000210	GRID	4002		129.0				456	·				•		٠					İ
000211	GRID	4003		124.0				456		•			٠		. :					i
000212	5+++**	****	*****	****	*****	*****	*****	*****	****	****	*****	**							<del></del>	
000213	5												- 12	: *		. ;;1	•			1
000214	5	COMPONE	NT NO. 4		PRESSURI	E VESSEL						٠.			· .			•		l i
000215	\$ C2AB	4000	4000	4.000	2020						,					,			•;	
000217	CBAR CBAR	4000 4010	4000 4000	4000 4010	3050 4000	-							ı						•	1
000218	CBAR	4020	4000	4020	4010	<del></del>	<del></del>				<del></del>	·			·					<u>-</u> ;
000219	CBAR	4025	4000	4025	4020			, ,					•	*				•	•	
000220	CHAR	4030	4000	4030	4025				•						•		•			
000221	GRID	4000		185-517		<del></del>		<del></del>		····		<del></del>	<del></del>			<del></del>	<del>`-</del>			-i
00022 <b>2</b>	GRID .	4010		164 • 105						•		•						-		1
000223	GRID	4020		142-692	5	,					•			• •						!
000224	GRID	4025		124 - 67												· .				_
000225	GRID	4030		121.28				•					1.							í
000226 00022 <b>7</b>	MAT1 . PBAR	7075 4000	10.3E6	3.9E6		2.6165-				. ,	·		1 41	<u> </u>	وميروفون					اَ
000220	5******	4000 *****	7075	104.400	51600.	21600.	103200	• • • • • • • • • • • • • • • • • • • •												- 1
000229	5	ት የተ <b>ተ</b> ቀ <b>ጥ ተቀ</b> ቸ		ጭ-ጥ <i>ጥማጣ ጥ</i> ቶች	ጥጥጥጥሞኞኞች)	ቀጥጥጻ <b>ጥ</b> ጃጃች ,	ጥጥጥጥጥች?	*****	*****	*****	******	***	• .		•					- !
000230	<b>S</b> .	COMPONE	NT NO. 5		PRESSUR	E VESSEL	CLOSURE	· -			····	<del></del>			<del></del>				<del></del>	-
000231	5		3	•	· ···				•								•			ì
000232	CBAR	50,00	5000	5000	4030					7		•	, .	1.5			•			ļ
000233	CHAR	5010	5010	5010	5000				<del></del>	· · · · · · · · · · · · · · · · · · ·		<del></del> i	<del></del>	<del></del>				<del></del> -	·····	
000234	GRID	5000		115.97								!	. '							1
000235	GRID	5010	***	110.28	01050	'	**************************************	1981 F & 44 4 4 4 4			,						EME hull ion season.	-		
000236	PBAR	5000	7075 ' '''	233•1	81850	81850•	163700	• 0545	•					1						Ì
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000237 000238	PBAR 5*****	5010	7075 *****	290 • 28 ******	64000.	64000. *****	12800.	• 0545 *****	*****	*****	****	**			,			•	
000239	3																	<del></del>	<del></del>
000240 .	\$	CONPON	ENT NO.6		LOWER '	THRUST ST	RUCTURE						•						
000241	<u> </u>				سسندر والمراجب														
000242	CBAR	6000	6000	6000	5010									· i					•
000243 000244	CBAR CBAR	6010 6020	6000 6000	6010 6020	6000 6010							•		1					
000245	CBAR	6030	6000	6030	6020				<del></del>	<del></del>			<del>:</del>	<u>-</u>		<u>·</u>			
000246	CBAR	6040	6040	6040	6030	,					•								
000247	CHAR	6050	6050	6050	6040				•						_				
000248	CBAR	6060	6060	6060	6050								1						• •
000249	CBAR	6070	6070	6070	6060								- '						
009250	GRID_	6000		98.0										<u>; ;                                   </u>			<del></del>	<del></del>	<del></del>
000251 000252	GRID GRID	6010 6020		86.33 74.50		٠.	•			•		٠						٠.	
000252	GRID	6030		68.58				•									:		
000254	GRID	6040		57.0		,					<del></del>			·	<del></del> :		7	<del></del>	
000255	GRID	6050		39.5			,					•					, ;		
000256	GRID	6060		32.38									·				_Ĺ		٠
00025 <b>7</b>	GRID	6070		29.0													1		
000258	GRID	6080	8000	25.0	125.0	39.50	* •	23456				-							
000259	GRID	6130	8000	25.0	215.0	39.50		23456								<del></del>	1		<del>,</del>
000260	MAT1	7039	10.1E5	3.78E6	0155	2.56E=4		0000		• .		من الأن		*	*	e			
000261 000262	PBAR PBAR	6000 6040	7039 7039	11.94 11.64	2155. 1989.	2155. 1989.	4310. 3978.	•0282 •0282		, ,				.*		•			
000262	PBAR	6050		10.681	1543.	1543.	3087	0282				<del></del>	<del>:</del>			· ·		<del></del>	<del></del>
000264	PBAR	6060	7039	9.90	1228.	1228.	2456.	•0282											
000265	PEAR	6070	7039	9.58	1114.	1114.	2228.	.0282			•		•			`,			,
000266	\$****	****	*****			******	******	*****	****	*****	****	**							•
000267	\$														٠.				
000268	\$	COMPON	MENT NO. 7	, 	GIMBAL										.; 	·			
000269	\$	2071	7074	7070	7000		40.0	10.0	4		-074					•			
000270	CBAR	7031	7031	7030	7000	0.0	10.0	-10.0	1		7031		•						
000271	+7031 CBAR	7032	7031	7030	7040	0.0	10.0	10.0	<del>-</del>	<del></del>	7032			<del></del>		····			<del></del>
000273	+7032	7032	4	7000	7040	0.0	10.0	10.0	1		,002		<u>.</u>	~ .					
000274	CBAR	7033	7031	7030	7010	0.0	-10.0	10.0	1		7033		•					• .	
000275	+7033		4									· · · · · · · · ·	<del></del>						<u>_</u>
000276	CBAR	7034	7031	7030	7020	0.0	-10.0	-10.0	1		7034		. •	• •		. =1			٠.
000277	+7034		4								<u> </u>								
000278	CONROD	7021	7020	8001	250	2.0		• .	•	,									
000279	CONROD	7022	7020	8010	250	2.0				*						•			
000290	CONROD	7023	7020	8002	250	2.0									<u> </u>				
000281	CONROD	7024 7041	7020 7040	8000 8030	250 250	2.0											•		
000282 000283	CONROD	7042	7040	8021	250	2.0			,								•		
000284	CONROD		7040	-8022	250	2.0						<del></del>	<del></del>						
000285	CONROD	7044	7040	8020	250	2.0									٠.				
000286	CTRIAZ	7121	8012	8000	8005	7020	• •	,	,	•						and the			
000287	CTRIA2	7122	8012	8001	8005	7020	· · · · · · · · · · · · · · · · · · ·			•		<del></del>		·					
0.00288	CTRIA2	7123	8012	8002	8005	7020								•					
000289	CTRIA2		8012	8010	8005	7020													
000290	CTRIA2		8012	8001	8000	7020							ţ						
000291	CTRIA2 CTRIA2		8012	8000	8002	7020 7020								;					
000292	CTRIA2		8012 8012	_8002 _8010		<del>7</del> 020	·	······································				<del></del>	· · · · ·	<del></del>			<del></del>	<u> </u>	<del></del>
000293	CTRIAZ		8012	8020	8025	7040	•			•									
000295	CTRIA2		8012	8021	8025	7040		,											
000276	CTRIAZ		8012	8022	8025	7040							•			<del></del>		Market	
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000297	CTRIA2	7144	8012	8030	8025	7040						;
862000	CTRIA2	7145	8012	8021	8020	7040						1
000299	CTRIA2	7146	8012	8020	8022	7040						
000300 -	CTRIA2	7147	8012	8022	8030	. 7040		•				!
000301	_CTRIA2_	7148	8012	8030	_8021.	7040						<u> </u>
000302	GRID	7000		23.0	0.0	-10.25		. :				i
000303	GRID	7010		23.0	0.0	10.25						
000304	GRID	7020		_23.0	-10.25	_0.0						
000305	GRID	7030		23.0	0.0	0.0						. !
000306	GRID	7040	01: 05:	23.0	10.25	0.0	•					. 1
000307 000308	MAT1 PBAR	_250 _7031	24.0E6	9.24E6		7.33E-4	00.0	· · · · · · · · · · · · · · · · · · ·				<del></del>
000309	5*****	7051.	250	3.0	10.0	10.0	20.0					
000309	⊅****** \$	****	****	******	*****	******	****	****	****	*****	*本本	į
000310		COMPONI	ENT NO. 8		TIPOED Y	HRUST STR	olicaline	<del></del>	<del></del>	<del></del>		<del>+</del>
000312	5	COM ON	TIMI 140. 0		OFFER 1	incoi 31	COCTORE			•		ļ
000313	CBAR	8000	8000	8090	8000	8160	0	. 0	2			ļ
000314	CBAR	-8001	8000	8001	8040	8110	_0	ŏ				<del></del> +
000315	CBAR	8002	8000	8170	8002	8110	0	0	2			
000315	CBAR	8010	8000	8010	8050	8160	0	. 0	2	•		i
000317	CBAR	8021	8000	3021	8100	8140	0		_5	<del></del> -		<del></del>
000318	CBAR	8022	8000	8050	8022	8140	0 -	n	2			1
000319	CBAR	8030	8000	8030	8180	8140	0	ő	2			. !
000320	CHAR	_8040	8000	8040	8020	8140	ŏ	_ ₀	_ <u>-</u>	· · · · · · · · · · · · · · · · · · ·		
000321	CBAR	8050	8000	8050	8210	8160	Ŏ.	o .	2			. 1
003322	CBAR	8052	8000	8190	8050	8140	0	0	2			i
003323	CBAR	8061	8170	0608	8080	-10.0	-10•	0.0	1	8061	·	<del></del>
009324	+8061			-3.4			-3.4		•	_		1
000325	CBAR	8065	8190	8060	8080	-10.0	-10.0	0.0	1	8065		ļ
000326	+8065			-2.5			-2.5					
000327	CBAR	8072	8000	8040	8070	8110	0	0	2			i
000328	CBAR	_8073	8170	8070	8060	-10.0	-10.	0.0	1	. 8073		<u>.</u> i.
000329	+8073			-3.4			-3.4					i
000330	CHAR	8075	8190	8070	8060	-10.0	-10.0	0.0	1	8075		.
000331	+8075			2.5			-2.5		·			!
000332	CBAR	8081	8000	8080	8040	8140	0	0	2			į
00033 <b>3</b> 000334	CBAR	8085	8190	8080	8090	<b>-10.0</b> .	-10.0	-10.0	1	8085		1
000335	+8085 	8095	8190	-2.5 -8090	8120		-2.5 -3.75	-14.0		0.05		
000336	+8095	8093	0190	<b>-2.5</b>	0120	-10.0	-2.5	-14.0	7	8095		
000337	CBAR	8105	8190	8100	8070	-10.0	-10.	10.	•	8105		
000338	+8105	_0103	0190	-2.5	_0070	-10.0	-2.5 -2.5	100		8105		
000339	CBAR	8125	8190	8120	8170	-10.0	3.75	-14.0	1	8125		
000340	+8125	0123	02.70	-2.5	0170	1000	-2.5	-140	•	DIEJ.		
000341	CBAR	8155	8190	8150	8100	-10.0	-3.75	14.0		8155		<del></del>
000342	+8155			<del>-</del> 2.5			-2.5	2110	<b>-</b> .	()230		i
000343	CBAR	8171	8170	8170	8090 .	-10.0	0.0	10.0	1	8171		i
000344	+8171			-3.4		<del></del>	-3.4					
000345.	CBAR	8175	8190 .	8170	8190	-10-0	10.0	-10.0	1	8175		1
000346	+8175			<del>-</del> 2.5			-2.5	•		_	The state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the s	
000347	CBAR	8161	8170	8180	8100	-10.0	0.0	10.0	_ ₁	8181		
000348	+8181			-3.4			-3.4					1
000349	CBAR	8185	8190	8180	8150	-10.0		14.0	1	8185		i
000350	+8185			-2.5			-2.5					
000351	CBAR	8191	8170	8190	8200	-10.	10.	0.	1	8191		:
000352	+8191			-3.4			-3.4	·	·			i
000353	CEAR	8195	8190	8190	8200	-10.0	10.0	0.0	1	8195		
000354	+8195	0001	0170	<b>-2.</b> 5		- 1.0	<del>-</del> 2.5	. 0			t .	
000355 000356		8201	8170	8200 -3.4	8210	<u>-10•</u>		0.	1	8201		
000000	, 050T			-0.4			-3.4	!				1
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000357 000358	CBAR +8205	8205	8190	8200 <b>-</b> 2.5	8210	-10.0	10.0	0.0	1	8205				<del></del>
000359	CBAR	8215	8190	8210	8180	-10.0	10.	10.	1	8215	· · · · · · · · · · · · · · · · · · ·		<del></del>	<del></del>
000360	+8215			-2.5			-2.5		*,	, 0215				16.0 C
000361	CODMEM	8006	8006	8040	8110	8130	8001				•		•	
000363	CQDMEM CQDMEM	8011 8043	8006	8050	8160	8130	8010				•			······································
000364	CODMEM	8192	გეეგ 8006	8040 8050	8110 8160	8140 8140	8020 8022				•	•		
000365	CROD	8041	8041	8040	8110	8051	-8041	8050	8160	<del></del> `	<del></del>		·	<u> </u>
000366	CROD	8071	8130	8110	8070	8161.	8130	8190	8160			٠,		
000367	CROD	8111	8130	8110	8140	8140	8130	8140	8180	:			•	
000368	CROD	8130	8130	8090	8130	8160	8130	8130	8160					
000369 000370	CROD CROD	8162	8130	8160	8140	8163	8130	8140	8100					
000370	CROD	_8171 _8210	8130 8130	8170 8160	8130	$\frac{8131}{1}$	8130	8130	8110	<del>~</del>	<u>: ·                                     </u>	<u>.i </u>		
000372	CTRIA2	8001	8001	8000	8210 8130	8110 8090	8130	8080	8110		•			
000373	CTRIA2	8002	8002	8005	8130	8000	,				9	•		
000374	CTRJA2	8003	8002	8005	8130	8010							<del></del>	<del></del>
000375	CTRIA2	8004	8001	8002	8130	8170						·		•
000376	CTRIA2	_8005_	8008	8005	8130	8002		ri .						
000377 000378	CTRIA2	8007	8001	8040	8110	8070		•						
000378	CTRIA2 CTRIA2	8003 8012	8002	8005	8130	8001				• •				
000380	CTRIA2	8013	8012 8012	8000 8001	8001 8010	8005 8005							i	
000381	CTR1A2	8014	8012	8010	8008	8005			*			·		, .
000382	. CTRIA2	8015	8012	8002	8000	8005				. •		• •		•
000383	CTRIAZ	8026	8008	8025	8140	0208			<del></del>					
000384	CTRIA2	8027	8002	8025	8140	8030				• .				•
000385	CTRIA2	8031	8001	8030	8140	8180						•		
000387	CTRIA2	~8032~ 8033	8012 8012	8021	8030	8025						<del></del>		· · · · · · · · · · · · · · · · · · ·
000388	CTRIA2	8034	8012	8030 8030	8022 8020	8025 8025								
000389	CTRIA2	8036	8012	8020	8021	8025				·	<u> </u>			
000390	CTRIA2	8052	8001	8050	8160	8210				4				
000391	CTRIA2	8082	8001	8040	8110	8080					•			
000392	CTRIA2	8121	8001	8050	8120	8170	· · · · · · · · · · · · · · · · · · ·			1 .	<del> </del>			<del></del>
000393 000394	CTRIA2	8151	8001	8100	8150	8180			•	·		•		
000395	CTRIA2 CTRIA2	819 <b>1</b> 819 <b>3</b>	8001 	8050	8160	8190	<u>.</u>						•	•
000396	CTRIA2	8194	8002 8002	8025 8025	8140 8140	8022 8021								
000397	CTRIA2	8195	8001	8023	8140	8100			•	•		٠.	. *	· . ·
000398	GRID	_8000		17.0	-13.25					<del></del>		····	<del></del>	
000399	GRID	8001		17.0	-7.25	3.0	•	•						•
000400	GRID	8002		17.0	-13.25	-3.0				*	e Section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the section of the sect	;		:
003401	GRID	8005		17.0	-10.25								<del></del>	
060403	GRID GRID	8010 8020		17.0 17.0	7.25	<del>-</del> 3.0 .								
000404	GRID	-8021		17.0	7•25 13•25	3.0 3.0			•					•
000405	GRID	8022		17.0	7.25	-3.0								
000406	GRID	8025		17.0	10.25	0.0	• • •			•				
000407	GRID	_8030		17.0	13.25	-3.0				<del></del>		The second second	the algebra	
000408	GRID	8040	•	17.0	0.0	10.25								
000409	GRID GRID	8050		17.0	0.0	-10.25		<u>:                                      </u>	·					
000411	GRID	-8069 8070	8000	28.0	0.0	24.25				·.	(			
000412	GRID	8080	8000	28.0	60. 120.	0 • 0 0 • 0								
000413	GRID	-8090	-8000-	28.0	-150·	-0.0	<del></del>	<del></del>		<del></del>	· · · · · · · · · · · · · · · · ·			
000414	GRID	8100	8000	28.0	30.	0.0					. 1.			
000415	GRID	8110		0.0	0.0	10.25				1	•		•	•
000416	GRID	8120	8000	28.0	180.	•0	~~~~	<del></del>		· ·		<del></del>		·
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000417	GRID	8130		0.0	-10.25	• 0											ļ
000418	GRID	8140		0.0	10.25	• 0	· · · · · · · · · · · · · · · · · · ·							٠. ٧			
000419	GRID	8150	8000	28.0	• 0	• 0								,			
000420 <u> </u>	GRID GRID	8160	0000	0.0	•0	-10.25											,
000421	-GRID	_8170 _8180	8000 8000	28.0 28.0	-150. -30.	•0		<u> </u>	<del></del>	<del></del>				<del></del>			
000423	GRID	8190	8000	28.0	-120.	• 0							•				i
000424	GRID	8200	9069	0.0	•0	-24.25					٠.			1			.1
003425	GRID	8210	8000	28.0	-60.	-0		<del></del>		<del></del>		·- ·- · · · · · ·	· · ·				
000426	GRID	8300	8000	25.0	215.0	0.0	0 .	23456			:					• • •	<b>I</b>
000427	GRID	8400	8000	25.0	125.0	0.0	Ō	23456		;							i
000428	MAT1	2024	10.5E6	4.0E6		2.6E-4											
000429 .	PBAR	8000	2024	1.17	•08	•26		Y			÷ '						i
000430	_PBAR	_8170	2024	0.50	4.3	•0005						.:			·		
000431	PUAR	8190	2024	• 8	2.36	2.36	3.55							•			
000432	PODMEM	8006	2024	0.10		,		•				i'				•	
000433	PROD	8041	2024	0.35			<del></del>					·- · · · · ·	·				
000434 /	PROD	8139	2024	0.435			<u>,</u>						٠.	*	. /		!
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000444	CROD	85011	8500	8501	8090	85012	8500	8501	8060	•							
000445	CROD	85021	8500	8502	8060	85022	8500	8502	8100			•		·	``	:	i
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000448	_CROD	85051	8500	8505	8170	85052	8500	8505	8090_			•	11 1	ř	<del></del>		
000449	CROD	85061	8500	8506	8100	85062	8500	8506	8180			•					,
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000452	CROD	85091	8500	8509	8200	85092	8500	8509	8170	•		٠.				٠.	
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000522         MPC         8700         8704         2         1.0         8700         2         -1.0           900523         MPC         8700         8705         2         1.0         8700         2         -1.0           000524         MPC         8700         8706         2         1.0         8700         2         -1.0           000525         MPC         8700         8707         2         1.0         8700         2         -1.0           000526         MPC         8700         8708         2         1.0         8700         2         -1.0           000527         MPC         8700         8710         2         1.0         8700         2         -1.0           000528         MPC         8700         8711         2         1.0         8700         2         -1.0           000529         MPC         8700         8701         3         1.0         8700         3         -1.0           000531         MPC         8700         8702         3         1.0         8700         3         -1.0           000532         MPC         8700         8704         3         1.0								_		***	·		<del></del>			<u> </u>	!
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000526         MPC         8700         8708         2         1.0         8700         2         -1.0           000527         MPC         8700         8709         2         1.0         8700         2         -1.0           000528         MPC         8700         8710         2         1.0         8700         2         -1.0           000529         MPC         8700         8711         2         1.0         8700         2         -1.0           000530         MPC         8700         8701         3         1.0         8700         3         -1.0           000531         MPC         8700         8702         3         1.0         8700         3         -1.0           000532         MPC         8700         8704         3         1.0         8700         3         -1.0           000533         MPC         8700         8705         3         1.0         8700         3         -1.0           000535         MPC         8700         8706         3         1.0         8700         3         -1.0           000536         MPC         8700         8707         3         1.0												. :	•				!
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APPENDIX A

CASE 8

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000007	+BC	300.0	-50.0	0.0					• :	_		,	;
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000009	+CYL	1000.0	1000.0	0.0									. !
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000024	SPC1	10	123456	8700	•								ì
000025	5*****			`````````````````````````````````````	*****				******	*****			
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000031	\$	MP	C TPA #2	TO TPA	#1			٠			*NEW		j.
000032	MPC	6062	6062	1	1.0	6061	<u> </u>	-1.0		<del></del>	*NEW		
000033	MPC	6062	6062	2	1.0	6061	2	-1.0	•		*NEW		
000034	MPC	6062	6062	3 .	1.0	6061	3	-1.0			*NEW	1	
000035	MPC,	7000	7000		1.0	6070	-1	-1.0		7000X	**=1	<del></del>	0.00
000036	+700 <b>0</b> X		6070	5	10.25					•	•	. 20	
000037	MPC	7000	7000	2	1.0	6070	2	-1.0	• •	Y000Y		,	
000038	+700 <b>0</b> Y		6070	4	-10.25	6070	-6	6.0	:				
000039	MPC	7000	7000	3	1.0	6070	3	-1.0		7000Z			#t.
000040	+7000Z		6070	5	-6.0								
000041	MPC	7000	7000	4	1.0	6070	4	-1.0			•		
000042	MPC	7000	7000	5	1.0	6070	5	-1.0					
000043	MPC	7000	7000	6	1.0	6070	6	-1.0	•				
000044	MPC	7010	7010	1	1.0	6070	1	-1.0		7010X		,	
000045 000046	+7010X MPC	7010	6070	5	-10.25	60220	o			-0104		•	
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000048	MPC	7010	7010	7	10.25	6070	7	0.0	•	-0107			
000049	+7010Z	7010	6070	- 3 - 5	1.0 -6.0	6070	3	-1.0	•	7010Z			
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000051	MPC	7010	7010	5	1.0	6070	4 5	-1.0					
000052	MPC	7010	7010	6	1.0	6070	6	-1.0				· į v	
000053	-MPC	-8300	6080	-ĭ	1.0-	6050	<del>``</del>	-1.0		-6080A		_ 1	1.1
000054	+6080A		6050	5	-20.48	6050	Ĝ.	-14.34		GOOM	1.		δ.
000055	MPC	8300	6130	1	1.0	6050	ī	-1.0		6130A		·	s .
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000057	MPC	8300	8300	1	1.0	8170	رر	-1.0							•	:	
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000084	GRID	30				40.		123456			,						
000085	PLOTEL	9001	10	1													
000085	PLOTEL	9002	20	2		•											
000087	PLOTEL	9003	30	3					•						. : .		
000088	PLOTEL	9010	8120	8005	·	9011	8005	8025					<u> </u>	<u>`:</u>			
000089	PLOTEL	9012	8025	8150		9013	8150	8140									
000090	PLOTEL	9014	8140	8130		9015	8130	8120			•						
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000099	CONM2	9001	2050	2	0 • 1.5	28.82	17.6	-2.09								,	
000100	CONM2	9002	5010	·	•037	-3.36	12.4	7.12	•		i *	:					
000101	CONMS	9003	5010		1.19	-2.82	• 0	•0									
000102	CONM2	9004	6060		0.98	2.42	-26.1	• 0								•	
000103	CONM2	9005	6050		•86	-1.5	26.5	14.5	•				-				
000104	COUNS	9006	6050		0.92	4.50	27.5	0.0				<del> </del>					
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000119	\$	0057	TORUS			- 44				200115					•	
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000122	5	OT.	NOZZLE	TO PV BOL	TS		71.		<del></del>			<del></del>		<del></del>		$\overline{}$
000123	CONM2	3057	3050		•096	. 1.07		•		BOLTS		.	,		•	!
000124	+BOLTS	51.15		25.65			25.65								٠.,	<u>i</u>
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000126	CONM2	5011	5010	8000	• 0344	24.5	10.	ra di salah								
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000129	CONWS	5014	5010	8000	•0344	24.5	70.				• ;		*			i
000130	CONM2	5015	5010	8000	.0344	24.50	90.		,							1
000131	CONM2	5016	5010	8000	•0344	24.50	110.									
000132	CONMS	5017	5010	8000	.0344	24.50	130.								•	!
000133	CONMS	5018	_5010	8000	.0344	24.50	150•	<del></del>					<del></del>	<del>;</del> -		
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000136	CONMS	50111	5010	8000	0344	24.50	210.							i		
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000138	CONM2	50113	5010	8000	.0344	24.50	250		* .							į
000139	CONMS	_50114_	5010	_8000	.0344	24.50	270.							!		!
000140	CONWS	50115	5010	8000	.0344	24.50	290•			4					•	
000141	CONM2	50116	5010	8000	.0344	-24.50	310.	A 188						•		i
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000153	CONM2	61301	6130	•	0.24			·	·		, ,		•			· 1
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000153	COHMS	84001	8400		0.24											. !
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000164	-CBAR	2050	2050	2050	2040	<del></del>	·							<del></del>		
000165	GRID	2000	2030	409.372			.*						•			1 1
0001665	GRID .	2020		351 - 543									·			1
000167	GRID	2040		296 • 865												
000168	GRID	2050	1 754	270 • 190		1 7555										i
000169	MAT1 PBAR	100 2020	1.7E6 100	_0.70E6 _40.865	55550	1.355E- 55550.		.00445	· · · · · · · · · · · · · · · · · · ·	.:	<del></del>		<del></del>	<del></del>		<del></del>
000171	PBAR .	2040	100	33.253	30250	30250.	60500.	•00445		,			;	•		!
000172	PBAR	2050	100	50.047	25400.		50800.	.00445						•		;
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000177	CBAR	3000	3000	3000	2050		1		•					•				
000178	CBAR	3010	3010	3010	3000									<u> </u>	`			
000179	CBAR	3020	3020	3020	3010													
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000181	CBAR	3040	_3040	3040	3030							· ·			····			<u>· i</u>
000182	CBAR	3050	3050	3050	3040			•										
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000185	GRID	3030		220.491				, ,						•			•	
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000138	GRID	3050		206 • 93				······································		· · · · · · · · · · · · · · · · · · ·	<del></del>	<del></del>	· ·		<del></del>		····	
000189	MAT1	347	29.356	11.4E6		7.394E-	4	1 .										
000190	PBAR	3000	347	11.5	3414.	3414.	6828.	•007							• •			1.
000191	PBAR	3010	347	32.3	4371.	4371.	8742.	•007		****								. 1
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000193	PEAR	_3030	347	_13.7	_333•	_333•	_666•	•007_			······································	<del></del>				·		
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000195	PHAR	3050	347	82.2	16170.	16170	32340.	•007							· /			
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000100	CELAS2	40011	41.8E5	4001	<del></del>	3050	<del></del>	<del></del>	<del></del>	<del></del>	<del></del>		<del></del>					
000201	CFLAS2	40012	9.41E6	4001	2	3050	2				:		•				. 7	
000202	CELA52	40013	9.41E6	4001	3	3050	3				•		i de la companya de la companya de la companya de la companya de la companya de la companya de la companya de	•	•		`. •	- 1
000203	CELAS2	40021	334.E6	4002	1	4001	1						<del></del>					
000204	· CELAS2	40022	61.7E6	4002	2	4001	2											
000205	CELA52	40023	61.756	4002	3	4001	3											t
000206	CELAS2		0.4856	4003	1	4002	1		,									
000207	CEL/S2	400324	16.5E6	4003	2	4002	2						•.	•				
000208	CELAS2	40033	_16.5E6	4003	3	4002	3											
000209	GRID	4001		170.0				456				٠.						į
000210	GRID	4002		129.0				456							•			1
000211	GRID	4003		124.0				456			A -dA -A -A -A	4		<del></del>				<del></del>
000212 000213	5 5	*****	*****	****	****	***	*****	*****	****	****	****	****						1
000213	5 5	COMPONE	ENT NO. 4		PRESSUR	E VESSEL							Part of the second		, •			1
000215	<u> </u>				- TRE330K					<del></del>			<del></del>	<u>•</u>				<del></del>
000216	CBAR	4000	4000	4000	3050						•				. 11			.
000217	CBAR	4010	4000	4010	4000						•					•	•	!
000218	CHAR	4020	4000	4020	4010			•						<del>~~.~~~~</del>				
000219	CBAR	4025	4000	4025	4020		`.								•	•		. !
000220	. CBAR	4030	4000	4030	4025						<u></u>		<u> </u>					
000221	GRID	4000		185 • 517														· I
000222	GRID	4010		164 - 105			•						. '-		•		•	ļ
000223	GRID	4020		142.692	25 .		•								<del>,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,</del>			
000224	GRID	4025		124.67														
000225	GRID	4030	10 754	121.28			,		•									ţ
000226.	MAT1 .	7075	10.3E6		·····	2.616E-		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	) <del>,                                     </del>				., , , , , ,	er stere	Carlos Carlos		<del></del>	i-
000227	PBAR	4000	7075	109.900	51600	310UU•	103200	• • U ] ] [	ig Lagranda da da da		ند ت ن بار تو نور د							1
000228 000229	\$***** \$	******	******	******	******	<b>ホホホ</b> Χ▼★ <b>▼</b> ▼ 、	·*****	*****	****	*****	****	テテキギ	•		•			1
000230	<u>\$</u>	COMBONIC	ENT NO. 5		PRECCIID	E VESSEL	רו מכוום	· F					<del></del>	· · · · · · · · · · · · · · · · · · ·	<del>,</del>			
000231	<b>.</b>	COMP. ONE		,	1 NESSOR	L VLJOEL	. 440308	`_		•								i
000231	⊅ CBAR	5000	5000	5000	4030													1
000232	CBAR	5010	-5010	5010	5000						<del></del>			·				<del></del>
000233	GRID	5000	3010	115.97	3000	•							Ι,					į
000235	GRID	5010		110.28					•				:					;
000236	PBAR	5000	7075	233.1	81850.	81850.	163700		5					·	•	<del>-</del>		
			· · · <u>-</u>		. •		· • •	•			:		•					1

	VRONAY	,428218	,1,100 F/	STRAND F	ILES MAN	IPULATIO	<u> </u>		DATE 0	3 APR 72	PAGE 5	7			
0002 <b>37</b> - 000238	PBAR 5*****	5010	7075	290 • 28	64000.	64000.	12800.	•0545 *****	*****	*****	k**			•	· .
000239													· · · · · · · · · · · · · · · · · · ·		
000240	. \$	CONPON	ENT NO.6		LOWER T	HRUST ST	RUCTURE								ì
000241											·				<u> </u>
000242	CBAR	6000	6000	6000	5010										- 1
000243	CBAR	6010	6000 6000	6010	6000						4			•	!
000244 000245	CBAR CBAR	_6020 6030	6000	6020 6030	_6010 6020						<u> </u>		<del></del>	· · · · · · · · · · · · · · · · · · ·	
000246	CBAR	6040	6040	6040	6030				٠.			•			. !
000247	CBAR	6050	6050	6050	6040							•			!
000248	CBAR	6060	6060	6060	6050	· · · · · · · · · · · · · · · · · · ·	<del></del>		· ·						
000249	CBAR	6070	6070	6070	6060			•		•	• ,				
000250	GRID	6000		98.0								<u> </u>			1
000251	GRID	6010		86.33				•			•		•		. ` [
000252	GRID	6020		74.50				· ·.				•			1
000253 000254	GRID GRID	6030 6040		_68.58 57.0	···					<del></del>	<del></del>			,	
000255	GRID	6050		39.5					• • •	•				•	1
000256	GRID	6060		32.38			•		C		,		$\cdot \cdot \cdot \cdot \cdot \cdot I$		1
000257	GRID	6070		29.0	<del></del>	······································				<del></del>			<del></del>		· i
000258	GRID	6080	8000	25.0	125.0	39.50		23456			,		. 1	•	i
000259	GRID	6130	8000	25.0	215.0	39.50		23456	,	,			1		
000260	MAT1	7039	10.1E6	3.78E6		2.56E-L				•					. !
000261	PBAR	6000	7039	11.94	2155.	2155.	4310.	•0282							ļ
000262	PBAR	6040	7039		1989	1989 <u>•</u>	3978	0282_			•				
000263 000264	PBAR - PBAR	6050 6060	7039 7039	10.681 9.90	1543. 1228.	1228•	3087• 2456•	•0282 •0282				. •	•		. i
000265	PBAR	6070	7039	9.58	1114.	1114.	2228.	•0282					13		. !
000266			*****						*****	*****	***		<del></del>		
000267	\$														ì
000268	\$	COMPON	ENT NO.	7	GIMBAL							··			i
000269	. \$														
000270	CBAR	7031	7031	7030	7000	0.0	10.0	-10.0	1	7031			• • •		!
000271 000272	+7031 	7032	<del>4</del> <del>7</del> 031	7030	7040	0.0	10.0	10.0	<del></del>	7032					
000273	+7032	1052	4	7020	7040	0 • 0	10.0	10.0	•	7032	•	1.			i
000274	CBAR	7033	7031	7030	7010	0.0	-10.0	10.0	1	7033	•	4 N	•		. :
000275	+7033		4									<del></del>	<del> </del>		
000276 .	CBAR	7034	7031	7030	7020	0.0	-10.0	-10.0	1	7034					, i
00u277	+7034		4							·	•				i
000278	CONROD	7021	7020	8001	250	2.0			•						
000279	CONROD	7022 7023	7020 7020	8010	250	2.0							**		!
00028 <b>0</b> 00028 <b>1</b>			7020 7020	8002 8000	250 250	2.0				· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·				
000282	CONROD	7041	7040	8030	250	2.0									i
000283	CONROD	7042	7040	8021	250	2.0				•	•				. !
000284	COMPOD	7043	7040	8022	250	2.0	·	<del></del> - <del></del>					· · · · ·		
000235	CONROD	7044	7040	8020	250	2.0.		•		• ;		• .	•		
000286	CTRIA2		8012	8000	8905	7020	•					17.50			i
000287	CTRIA2		8012	8001	8005	7020									
000238	CTRIA2	7123	8012	8002	8005	7020	:		·. · ·						1
000289 000290	CTRIA2 CTRIA2	7124 7125	8012 8012	8010 8001	8005 8000	_7020 _7020	,	<del></del>	·			· · · · · ·	·	·	
000290	CTRIA2	7125	8012	8000	8002	7020	•	!							• ;
000292	SAIRTO	7127	8012	8002	8010	7020		. 1				• :			į
000293	CTRIA2		8012-	8010	-8001-	7020-		<del>-                                    </del>	·	<del></del>	<del></del>				
000294	CTRIA2	7141	8012	8020	8025	7040									
000295	CTRIA2	7142	8012	8021	8025	7040					·		·		
000296	CTRIA2	7143	8012	8022	8025	7040				*.					

	VRONAY	,428218	11100 FA	STRAND F	ILES MAN	IPULATIO	N		DATE 03 A	PR 72 P	AGE 58
000297	CTRIA2	7144	8012	8030	8025	7040					İ
000298	CTRIA2	7145	8012	8021	8020	7040					
000299	TCTRIA2	7146	8012	- 8020	8022	7040	- <del></del>	<u></u>		<del></del>	
000300	CTRIA2	7147	8012	8022	8030	7040	7				
000301	CTRIA2	7148.	. 8012	8030	8021	7040		• •	•		
000302	GRID	7000		23.0	0.0	-10.25					
00u30 <b>3</b>	GRID	7010		23.0	0.0	10.25	•	•			
000304	GRID	7020		23.0	-10.25						
000305	GRID	7030		23.0	0.0	0.0					
000306	GRID	7040		23.0	10.25	0.0			•		
000307 000303	MAT1	_250 _7031	24.0E6	9.24E6		7.33E-4			· · · · · · · · · · · · · · · · · · ·		
000309	PBAR 5*****	1007	250	3.0	10.0	10.0	20.0				
000310	\$ \$	***	*****	****	****	****	****	***	****	*****	
0,0,0311		COMPON	ENT NO. 8		UPPER T	HRUST ST	RUCTURF			<del></del>	
000312	\$	0011. 011	2		0						
000313	CBAR	8000	8000	8090	8000	8160	0	.0	2		
000314	CBAR	8001	8000	8001	8040	8110	0 .,	0	2		
00u315 .	CBAR	8002	8000	8170	8002	8110	0 ·	0	2		
000316	CBAR	8010	8000	8010	8050	8160	_0	0	_2		
000317	CBAR	8021	8000	8021	8100	8140	0	0	2		
000318	CBAR	8022	8000	8050	8022	8140	0	0	2		
000319	CBAR	_8030 8040	8000	8030 8090	_8180	8140	_0	0	_2		
000320	CBAR. CBAR	8050	8000 8000	8050	3020 8210	8140 8160	0	0	2		
000322	CBAR	8052	8000	8190	8050	8140	0 -	. 0	2		
000323	CBAR	8051	8170	8060	8080	-10.0	-10.	0.0		8061	
000324	+8061	0002	,0170	-3.4	0000	2000	-3.4	0.0	•	8001	
000325	CBAR	8065	8190	8060	8080	-10.0	-10.0	0.0	1	8065	
000326	_+806 <b>5</b>			-2.5			-2.5		····		
000327	CBAR	8072	8000	8040	8070	8110	0	0	2		
000328	CBAR	8073	8170	8070	8060	-10.0	-10.	0.0	1	8073	
000329	+8073			-3.4			-3.4		•		
000330	CBAR	8075	8190	8070	8060	-10.0	-10.0	0.0	<b>1</b> ' '	8075	
000331	_+8075			-2.5			2.5 				
000332	CBAR CBAR	~8081 8085	8000 8190		8040 8090	8140 -10.0	-10.0	0 -10.0	2	8085	
000334	+8085	0000	0190	<del>-</del> 2.5	3090	-10+0	-2.5	-10.0		0000	
000335	CBAR	8095	8190	_8060	8120	-10.0	-3.75	-14.0	<u> </u>	8095	
000336	+8095	00,0	. 02.0	-2.5	0120	1000	-2.5	2440	•	0013	
000337	CHAR	8105	8190	8100	8070	-10.0	-10.	10.	1	8105	
000338	+8105			-2.5			-2.5		<del></del>		
000339	CBAR	8125	8190	8120	8170	-10.0	3.75	-14.0	1	8125	
000340	+8125			-2.5	name i a l'interdente		-2.5				
000341	CHAR	8155	8190	8150	8100	-10.0	-3.75	14.0	1	8155	
000342	+8155	01-1	0170	-2.5	. 0.000	10.0	-2.5	10.0	•	0171	
000343	CUAR	8171	8170	8170	8090	-10.0	_0.0	10.0	<u> 1 ·                                    </u>	8171	
000344	-+8171 	8175	8190	-3.4 8170	8190	-10.0	-3.4 10.0	-10.0	1 .	8175	
000346	+8175	0113	0190	-2.5	07 20	-10.0	<b>-2.5</b>	- <b>- 10 • U</b>		0113	The state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the s
000347	CBAR	8181	8170	-8180	8100	-10.0	-0.0	10.0	1	8181	
000348	+8181			-3.4			-3.4				
000349	CBAR	8185	8190	8180	8150	-10.0		14.0	1	8185	
000350	+8185			-2.5			-2.5				
00035 <b>1</b>	CBAR	8191	8170	8190	8200	-10.	10.	0.	1	8191	
000352	+8191			-3.4			-3.4	<u> </u>			
000353	CRAK	8195	8190	8160	8200	-10.0	10.0	0.0	1	8195	
000354	+8195	. 0201	0170	-2.5	4210	10	-2.5	0	1	0001	
000355 000355	CBAR +8201	8201	8170	8200 -3.4	ຼ ຍຣາດ	10 •	10. 			8201	To elicate to a set as a set as a problem to be the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction o
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000357	CBAR	8205	8190	8200	8210	-10.0	<b>5</b> .0	0.0	1	8205				l L
000358	+8205						-2.5				<del></del>		·	<del></del>
000359	CBAR	8215	8190	8210	8180	-10.0	: 10.	10.	1	8215				i
000360 <u> </u>	+8215 CODMEM	8006	8006	<b>-</b> 2.5 8040	8110.	8130	-2.5 8001							• 1
000362	CODMEM	-8011	8006	8050	8160	8130	8010					<del></del>		<u> </u>
000362 000363	CODMEM	8043	8006	8040	8110	8140	8020					•	·	
000364	CODMEM	8192	8006	8050	8160	8140	8022				* •			. ;
000365	CROD	8041	8041	8040	8110	8051	8041	8050	8160					
000366	CROD	8071	8130	8110	8070	8161	8130	8190	8160	•				
000367	CROD	8111	8130	8110	8140	8140	8130_	8140	8180	:		·		1
000368	CROD	8130	8130	8090	8130	8160	8130	8130	8160	,				
000259	CROD	8162	8130	8160	8140	8163	8130	8140	8100	• •	•			
000370	CROD	8171	8130	8170	8130	8131	8130	8130	8110			, ·		
000371	CROD	8210	8130	8160	8210	8110	8130	8080	8110					
000372	CTRIA2	8001	8001	8000	8130	18090 -								
000373	CTRIA2	8002	8002	8005	8130	_8000			·			<del></del>	<del></del>	
000374	CTRIA2	8003	8002	8005	8130	8010	•				· .**	1.8	<i>.</i> .	. I
000375 000376	CTRIA2 CTRIA2	8004 8005	8001	8002 8005	8130 8130	8170		٠.			• .		· /	. !
000375	CTRIAZ	_8005_ -8007	8002 8001	8005 8040	8110	_8002 _8070			· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	·	<del></del>	· · · · · · · · · · · · · · · · · · ·	
000378	CTRIA2	8008	8002	8005	8130	8001							1	•
000379	CTRIA2	8012	8012	8000	8001	8005							1	·
000380	CTRIAZ	8013	8012	8001	8010	8005		<del></del>		· · · · · · · · · · · · · · · · · · ·		<del></del>		<del></del>
000381	CTRIA2	8014	8012	8010	8002	8005		•						
000382	CTRIA2	8015	8012	8002	8000	8005	•	•	,	;	•		•	
000383	CTRIAZ	T8026T	8002	8025	8140	8020								· · · · · · · · · · · · · · · · · · ·
000384	. CTRIA2	8027	8002	8025	8140	8030			•					(
000385	CTRIAZ	8031	8001	8030	81.40	8180	• •						* *	; !
000386	CTRIA2	_8032	8012	8021	8030	8025					1			
000387	CTRIA2	8033	5012	8030	8022	8025	•			*				}
000388	CTRIA2	8034	8012	8022	8020	8025						· .	<u>.</u>	i
000389	CTRIA2	8036	8012	8020	8021	8025		:			·			
000390	. CTRIA2	8052	8001	8050	8160	8210							. 4	ļ
000391	CTRIA2	8082	8001	8040	8110	8080		·			·			
000392	CTRIA2	8121	8001	8090	8120	8170				· · · · · · · · · · · · · · · · · · ·				
000393	CTRIA2	8151	8001	8100	8150	8180		•				• :	•	
000394	CTRIA2	8191	8001	8050	8160	8190			<del></del>			·•	· · · · · · · · · · · · · · · · · · ·	
000395	CTRIA2	8193 8194	8002 8002	8025 8025	8140 8140	8022 8021				•			.,, :	
000397	CTRIA2	8195	8001	8021	B140	8100			:	•				•
000398	GRID	-8000		17.0	-13.25	3.0						<del></del>		
000399	GRID	8001		17.0	-7.25	3.0								
000400	GRID	8002		17.0	-13.25	-3.0								
000401	GRID	-8005		17.0	-10.25	-0.0			<del></del>	<del></del>		<del></del>	<del> </del>	
000402	GRID	8010		17.0	-7.25	-3.0		:				•		
000403	GRID	8020		17.0	7.25	.3.0	•	٠.	٠.					į
003404	GRID	8021		17.0	13.25	3.0	<del></del>	· · · · · · · · · · · · · · · · · · ·						
000405	GRID	8022	•	17.0	7 • 25	-3.0						and the second		
000406	GRID	8025		17.0	10.25	0.0						**. **	4 1 6 28, y 20	
000407	GRID	-8030-		17.0	13.25	-3.0				,				
000408	GRID	8040		17.0	0.0	10.25				• :			.*	* * * * * * * * * * * * * * * * * * *
000409	GRID	8050		17.0	0.0	-10.25		\$ .·				<u> </u>		
000410	GRID	8060	2000	0.0	0.0	24.25						•		
000411	GRID	8070	8000	28.0	60.	0.0			•					
000412	GRID	- 8080 	8000	28.0	120.	0.0		<u>;</u>				<u> </u>	·	·
000413	GRID	8090	8000	28.0	150.	0.0		i			١.	•	•	
000414 000415	GRID GRID	8100 8110	8000	28.0 0.0	30. 0.0	10.25		1				1		
000416	SKID	3120	8000-	28.n	130.				<del></del>	<del></del>			· · · · · · · · · · · · · · · · · · ·	
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000417 000418	GRID GRID	8130 8140		0.0	-10.25 10.25	• 0									•	. • .		1
000419	GRID	8150	8000	28.0	• 0	• 0	······································							<del></del>	<del>~~</del>	<del></del>		+
000420	GRID	8160		0.0	• 0	-10.25								• .				ì
000421	GRID	8170	8000	28.0	-150.	• 0												İ
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000425	-GRID	8210	8000						<del> </del>		<del></del>					<del></del>		÷
000426	GRID	8300	8000	25.0	215.0	0.0	0	23456								•		ļ
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000429	PBAR	8000	2024	1.17	•08	•26		•		-				. '	• •			i
000430	PBAR	8170	_2024	0.50	4.3	.0002			****									ľ
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000436	PTRIA2	8002	2024	0.20			•	•					٠.	. +	· /			!
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000430	CROD	86111	8600	8611	8710	86112	8600	8611	8709				•			•	
000481	GRID	3600	8000	80.0	90.	-219.0	8000	456					, ,				
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000493	GRID	8700	8000	85.0	90.	-320	0000	456		•							
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000509	MPC	8700	8702		1.0	8700	1	-1.0			••	· · · · · ·	· · · · ·		<del></del>		
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000550         CMASS4 108  0.1940 108           000551         CMASS4 109  0.2043 109           000552         CELAS4 204  1.25166 104           000553         CELAS4 205  1.26266 105           000554         CELAS4 206  7.45765 106           000555         CELAS4 207  6.72965 107           000556         CELAS4 208  8.81855 100           000557         CELAS4 209  9.91465 100           000558         5  THESE ARE THE MPC'S FOR THE MODAL CONSTRAINTS           000559         5  MODAL CONSTRAINT EQUATIONS           000560         5************************************	
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APPENDIX B

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MULTI-POINT CONSTRAINT EQUATIONS

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000001				_				
100000	· MPC	8500	8500	1 1.0000	101	0 •0000	85001A	
000003	MPC	8500	8500	2 1.0000	101	0 .0000	850021	
000003	MPC MPC	8500	8500	3 1.0000	101	0 -10000	A5003A	
000005	MPC	8500 8500	8501	1 1.0000	101	00000	85011A '	
000006	MPC		8501	2 1.0000	101	0 .0000	85012A	<u> </u>
900007	MPC MPC	8500 8500	8501	3 1.0000	101	0 -1.0000	85013A .	
000005	MPC MPC	8500 8500	8502	1 1.0000	101	00000	85021A	
000009	MPC		8502	2 1.0000	101	0 .0000	85022A	
000039	MPC	8500 8500	8502	3 1.0000	101	· · 0 -1 • 0000	85023A	
000011	MPC MPC		8503	1 1.0000	101	0. •0000	85031A	
000012	MPC	8500	8503	2 1.0000	101	0 .0000	85032A	
000012	MPC	8500 8500	8503.	3 1.0000	101	0 -1.+0000	85033A	
000014	MPC	8500	8504	1 1.0000	101	00000	85041A	•
000015	MPC MPC	8500	8504	2 1.0000	101	. 0 .0000	85042A	
000015	MPC	8500	8504	3 1.0000	101	0 -1.0000	85043A	
000017	MPC	<u> </u>	8505	1 1.0000	101	00000	85051A	
000017	MPC	8500	8505	2 1.0000	101	0 .0000	85052A	į
000019	N:PC	8500	8505-	3 1.0000	101	0 -1.0000	85053A	
000020	MPC	-8500	8506	<u>1</u> 1.0000	101	0 .0000	85061A	
000021	MPC	8500	8506	2 1.0000	101	0 .0000	85062A	
000022	MPC	8500	8506	3 1.0000	101	0 -10000	85063A .	•
000023	MPC -	8500	8507	1 1.0000	101	0 •0000	85071A	
000024	MPC .	8500	8507	2 1.0000	101	0 .0000	850721	
000025	MPC .	8500	850 <b>7</b> 8508	3 1.0000	101	0 -1.0000	85073A 🕟	
000025	MPC	8500	8508 8508	1 1.0000	101	0 .0000	85081A	· •
000027	MPC	8500		2 1.0000	101	0 .0000	85082A	
000028	MPC	8500	8508 1 8509	3 1.0000	101	0 -1.0000	85083A	
000029	MPC MPC	8500	8509	1 1.0000	101	0 •0000	85091A	
000030	MPC	8500	8509 8509	2 1.0000	101	0 0000	85092A	
000031	MPC	8500	8510	3 1.0000	101	0 -1.0000	85093A	and the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second o
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000033	MPC	8500	8510	2 1.0000 3 1.0000	101	0 0000	85102A	
000034	MPC	8500	8511 .	1 1.0000	101 101	0 -1.0000	85103A	
000035	MPC-	8500	8511	-2-1.0000		0 •0000	85111A	
000036	MPC	8500	8511	3 1.0000	101	0 -1.0000	85112A	Preceding name bloom
000037	MPC	8500	8600	1 1.0000	101	2.00000	85113A	Preceding page blank
000038	MPC	8500	8600	2 1.0000	101	0 .0000	A6001A	
000039	MPC	8500	8600	3 1.0000	101		86002A	
000040	MPC	8500	8601	1 1.0000	101	0 <b>-1.</b> 0000 0 •0000	86003A	
000001	Pib.C.	-6500	8601	2 1.0000	101		86011A	
000042	MPC	8500	8601	3 1.0000	101	0 .0000	860124	
000643	MPC	8500	8602	1 1.0000	101	0 •0000	86013A	• ,
000044	MPC	8500	8602.	2-1.0000	ini	0 .0000	86021.4	
000045	MPC	8500	8602	3 1.0000	101	0 -1.0000	86022A 86023A	
000046	MPC .	8500	8603	1 1.0000	101	0 .0000		
000047	MPC	8500	8603	2 1.0000	ini	0 .0000	86031A 86032A	
000048	MPC	8500	8603	3 1.0000	101	0 -1.0000	86033A	
000049	MPC	8500	8604	1 1.0000	101	0 •0000	86041A	•.
000050	MPC	-8500	3604	2 1.0000	-101	0.0000	860424	
000051	MPC	8500	8604	3 1.0000	101	0 -1.0000	86043A ·	
000052	MPC	8500	8605	1 - 1.0000	101	0 •0000	86051A	
000053	MPC	8500	8605	2-1.0000	-101	•0000	86052A	
000054	MPC	8500	8605	3 1.0000	101	0 -1.0000	86053A	***************************************
000055	MPC	8500	8606	1 1.0000	101	0 •0000		
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000057	MPC 8500	8606	3 1.0000	101	0 -1.0000	86063A	
000058	MPC 8500	8607	1 1.0000	101	0 .0000	86071A	
000059	MPC 8500	8607	2 1.0000	101	0 .0000	86072A	
000060	MPC 8500	8607	3 1.0000	101	0 -1.0000	86073A	!
000061	MPC 8500 .	8608	1 1.0000	101	0 .0000	86081A	
000062 000063	MPC 8500 MPC 8500	8608	2 1.0000	101	0 .0000	86032A	
000064	MPC 8500 MPC 8500	8608 8609	3 1.0000 1 1.0000	101 101	0 -1.0000 0 -0000	86083A 86091A	
000065	MPC 8500	8609	2 1.0000	101	0 .0000	86092A	
000066	MPC 8500	8609	3 1.0000	101	0 -1.0000	86093A	1
000067	MPC 8500	8610	1 1.0000	101	0 •0000	86101A	
000068	MPC 8500	8610	2 1.0000	101	0 •0000	861024	
000069 .	MPC 8500	8610	3 1.0000	101	0 -1.0000	86103A	$oldsymbol{I}$
000070	MPC 8500	8611	1 1.0000	101	0 .0000	86111A	· · · · · · · · · · · · · · · · · · ·
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000073	MPC 8500 +850 <b>01A</b>	8611 102	3 1.0000 0 .0000	101 103	0 -1.0000	86113A	
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000075 .	+85003A	102	0 .0000	103	0 •0000	85002F	
000076	+85011A	102	0 .5000	103	0 •3806	85011B	
000077	+85012A	102	0 •8660	103	0 •6285	85012B	
000078	+85013A	102 /	0 .0000	103	0 •1691	85013B	-1
000079	+85021A	102	05000	103	0 3806	85021B	
000080 000031	+85022A +85023A	102	0 •8660	103	. 0 •6285	850228	
000082	+85031A	102 102	0 .0000 0 .8660	103 103	0 •.1691 0 •6592	% 85023B 85031B	
060083	+85032A	102	-0 .5000	103	0 •3629	85032B	
000084	+85033A	102	0 .0000	103	. 0 •2929	85033B	
000085	+85041A	102	08660	103	0 ••6592	85041B	
000086	+850421	102	0 .5000	103	0 •3629	85042B	· · · · · · · · · · · · · · · · · · ·
000087	+85043A	102	0000	103	0 ••• 2929	° 850438	
000088	+85051A .	102	0 1.0000	103	0 .7612	85051B	
000089 000090	+85052A +85053A	102	0 .0000	103	0 •0000	850528	
000090	+85053A +85061A	102 102	0 .0000 0 -1.0000	103 103	0 •3382 0 •••7612	85053B	
-000092	+85062A	102	0 .0000	103	07612	85061B 85062B	
000093	+85063A	102	0 .0000	103	0 ••• 3382	85063B	
000094	+85071A	102	0 .8660	103	0 •6592	85071B	
000095	+85072A	102	05000	103	03629	85072B	
000096	+85073A	102	0 .0000	103	0 •2929	850738	
000097	485081A	102	08660	103	06592	85081B	
000098 000099	+85082A	102	05000	103	03629	85082B	
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000101	+850921	102	08660	103	0 •3806 0 ••6285	85091B 85092B	
000102	+85093A	102	0 .0000	103	0 •1691	85093B	
000103	+85101A	102	05000	103	0 3806	851018	
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000111	+86003A	102	0 .0000	103	0 .0000	86003B	
000112	+86011A	102	0 .5000	103	0 ••• 0739	86011B	
000113	+86012A	102	0 .8660.	103	00981	86012B	
000114	+86013A	102	0 .0000	103	0 •2403	86013B	·
000115	+85021A	102	05000	103	0 •0739	86021B .	
000116	4888098+	102	· 8660 ·	103	0 0981	860889	

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000117 000118	+86023A +86031A	102 102	0 .0000 0 .8660	103 103	0 •••2403 0 •••1279	86023B 86031B		
000119	+86032A	102	-5000	103	0 - 0566	860328		
000120	+86033A	102	0 .0000	103	0 •4163	86033B		
000121	+86041A	102	08660	103	0 •1279	860418		
000122	AS40484	102	5000	103	0 0566	86042B		ļ
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000125	+86052A	102	0 .0000	103	0 .0000	86051B 86052B		
000126	+86053A	102	0 .0000	103	0 •4807	860538		. !
000127	+86061A	102	0 -1.0000	103	0 •1477	86061B		i.
000128	+86062A	102	0 .0000	103	0 .0000	86062B		
000129	+86063A	102	00000	103	0 4807	86063B		. !
000130	+86071A	102	0 •8660	103	0 • 1279	860719		<u></u>
000131 000132	+86072A	102	05000	103	0 •0566	86072B		
000132	+86073A +86081A	102 102	0 .0000 08660	103 103	0 •4163 0 •1279	86073B		
000134	+86084 +86082A	102	05000	103	. 0 •0566	86081B * 86082B		<del>`</del>
000135	+86083A	102	0 .0000	103	0 ⊶.4163	86083B	<i>;</i>	
000136	+85091A	102	0 •5000	103	0 0739	86091B	· · /	
000137	+86092A	102	08660	103	0 •0981	860928	<del></del>	+
000138	+86093∧	102	0 .0000	103	0 •2403	86093B		• •
000139	+86101A	102	05000	103	0 •0739	86101B		i
000140	+86102A	102	08660	103	0 •0981	86102B		
000141	+86103A	102	0 .0000	103	0 2403	86103B		
000142	+86111A	102	0000	103	0 .0000	86111B	•	
000144	+85112A +86113A	102 102	0 -1.0000	103	0 •1132	86112B		
000145	+85001B	104	0 .0000	103 - 105	0 •0000 0 •0000	86113B 85001C		
000145	+85002B	104	0 .8624	1.05	0 •0496	85001C		<del></del>
000147	+85003B	104	0 .0000	105	0 •0000	85003C		i i
000145	+85011B	104	0 .4771	105	0 •0695	85011C		1. 1
000149	+850128	104	0 .7468	105	0 •0430	85012C		
000150	+850138	104	00564	105	0 •3531	85013C		
000151	+850218	104	04771	105	0•0695	85021C		
000152	+85022B	104	0 .7468	105	0 0430	85022C		*
000153 000354	+8502 <b>3</b> B +85031B	104	0 •0564	105	0 3531	85023C		
000155	+850328	104	0 .8264	105	0 •1203	85031C		
000156	+850338	104 104	00976	105	0 •0248 0 •6116	85032C 85033C	.:1	· , ;
000157	+85041B	104	08264	105	0 1203	85041C	•	
000158	+850428	104	0 .4312	105	.0 •0248	85042C		
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000160	+85051B	104	0 •9543	105	. 0 •1389	85051C		
000161	+650528	104	0000	105	0 0000	85052C		
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000163	+850618	104	09543	105	01389	85061C		!
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000168	+85073B	104	00976	105	0 •6116	85073C		. !
000169	+85081B	104	08264	105	0 1203	85081C		
000170	+850828	104	04312	105	0 0248	85082C		
000171	+850838	104	0 .0976	105	06116	85083C	•	1.
000172	+850918	104	0 • 4771	105	0 •0695	85091C		
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000177	+851038	104	0 •0564 10	5 0 •• 3531	85103C	
000178	+851118	104	0 .0000 10		85111C	
00179	+851128	104	08624 10		85112C	<del></del>
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00181	+86001B	104	0 .0000 10		86001C	·
00182	+8C002B	104	03543 10		860020	
00183	+860038	104	0 .0000 10		86003C	
00184	+860118	104	01574 10		86011C	
00185	+860128	104	03068 10		860120	
00186	+860138	104	0 410710		86013C	
00187	+860218	104	0 •1574 10		86021C	•
00188	+860228	104	03068 10	5 0 •0240	86022C	
00189	+860238	104	0 .4107 10	5 0 •0013	86023C	
00190	+860319	104	02727 10		86031C	•
00191	+86032B	104	01771 10	5 0 •0138	86032C	
00192	+860 <b>33</b> E	104	07113 10		86033C	•
00193	+860418	104	0 .2727 10		86041C	
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00195	+86043B	104	0 .7113 10		86043C	
00196	+86051B	104	03149 10		86051C	<u> </u>
00197	+860528	104	0 .0000 10		86052C	<u> </u>
00198	+86053B	104	08213 10		86053C	1
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00200	+860628	104	0 .0000 10		86062 <b>C</b>	
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00205	+860818	104	0 •2727 10		86081C	,
00205	+860828	104	0 •1771 10		86082C	
00207	+86083B	104	0 •7113 10		86083C	
09208	+850918	104	01574 10		86091C	
00209	+860928	104	0 .3068 10		86092C	
00210	+860938	104	04107 10		86093C	
00211	+861018	104	0 .1574 1.0		86101C	
00212	+861028	104	0 • 3068 1.0		86102C	
00213	+86103B	104	0 •4107 10		86103C	
00214	+861118	104	0 .0000 10		861110	•
00215	+861128	104	0 .3543 10		86112C	
00216	+861138	104	0 .0000 10		86113C	
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<b>000237</b>	+85063C	. 106	0 .0871	107	0 •1031	85063D	
000238	+85071C	106	00694	107	0 •1369	85071D	
000239	+85072C ·	106	0 .0190	107	0 .0006	850720	
000240 .	+85073C	106	00755	107	0 0893	850730	
000241	+85081C	. 106	0 .0694	107	01369	850810	·
000242	+85082C	106	0 .0190	107	0 .0006	850820	
000243	+85083 <b>C</b>	1.06	0 •0755	107	0 •0893	850830	
000244	+85091C	106	00401	107	0 •0790	850910	
000245	+85092C	106	0 .0328	107	0 .0011	850920	
000246	+85093C	106	00436	107	0 • • 0516	850930	
000247	+85101C	106	00401	107	0 0790	85101D	
000248	+85102C	106	0 .0328	107	0 .0011	851020	
000249	+85103C	106	0 • 0436	107	0 .0516	851030	•
000250	+85111C	106	00	107	0 •0000	851110	
000251	+85112C	106	0 .0379	107	0 •0013	851120	
000252	+85113 <b>C</b>	106	0 .0000	107	0 •0000	85113D	•
000253	<u>+86001C</u>	106	00000	107	00000	86001D	
000254	+85002C	106	00739	107	- 0•0003	860020	
000255	- +86003C	106	0 .0000	107	0 .0000	860030	
000255	<u>+86011C</u>	106	00673	1.07	0 = 0039	860110	
000257	+86012C	106	00640	107	00002	860120	
000258	+86013C	106	0 .0597	107	0 •0005	860130	·
000259	+86021C	106	0 .0673	107	0 •0039	860210	
000260	+86022C	106	00640	107	00002	860220	
007261	+86023C	106	00597	107	00005	860230	
262020	+86031C	106	01166	107	0 0067	86031D	
000263	+86032C	106	00369	1.07	0 0001	860320	
000264	+860330	106	. 0 •1034	107	0 •0008	86.0330	
000265	+86041C	106	0 •1166	107	0 •0067	860410	
000265	+85042C	106	00369	107	00001	860420	
000267 000263	+86043C	106	0 1034	107	8000 0	86043D	
000269	+86051C	1.06	01347	107	0 0077	860510	
000270	+66052C +86053C	106	0.0000	107	0 0000	860520	
000270	+86053C +86061C	106	0 •1194	107	0 •0010	86053D	
000272	+660620	106	0 .1347	107	0 •0077	86061D	,
000272	+86063C	106	0000	107	0 .0000	860620	
000274	+860710	106 106	01194 01166	107 107	0 0010	860630	
000275	+360720	106			0 0067	860710	•
000276	+86073C	106	0 .0369	107	0 .0001	860720	
000277	+86081C	106	0 •1166	107	0 •0008 0 •0067	86073D 86081D	
000278	+86082C	106	0 .0369	<del></del>	.0 .0001		
000279	+86083C	106	01034	107	0 ~.0008	860820	
000280	+86091C	106	00673	107	00039	860835 860915	
000281	+86092C	106	0 .0640				
000282	+86093C	106	0 .0597	107	0 •0002 0 •0005	86092D 86093D	
000283.	+86101C	106	0 .0673	107	0 •0003	86101D	
000284	+86102C	106	-00640	107	0 .0039 .		
000235	+85103C	106	00597	107	0 -0005	861020	
000286	+86111C	106	0 .0000	107	0 •0000	86103D 86111D	
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000288	+86113C	106	0 .0000	107	0 •0003 0 •0000	861120	
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	+85002D	108	0 .0249	109	0 • 0395		
000291	+850030	108	0 .0000	109	0 •0000	*	
000292	+850110	108	03739	109	0 •2263		
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000297	+850230	108	02015	્ય 109	0 .0979	
000298	+85031D	108	06475	109	0 •3920	
000299	+850320	108	0 .0125	109	0 •••0198	
000300	+850335	108	0 .3490	109	0 1695	
000301 000302	+85041D +85042D	108 108	0 .6475 0 .0125	109 109	03920 00198	
000303	+85043D	108	03490	109	0 •1695	
-000304	+85051D	108	07477	109	0 .4527	
000305	+850520	108	0 .0000	109	0 •0000	
000306	+850530	108	0 •4030	109	01958	
000307	+85061D	108	0 .7477	109	0 4527	
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000309	+85071D	108	06475	109	0 •3920	
000311	+85072D	108	00125	109	0 .0198	
000312	+85073D	108	0 .3490	109	0 1695	
000313	+85081D	108	0 .6475	109	0 3920	
000314	+850820	108	00125	109	0 •0198	
000315	+85083D	108	03490	109	0 •1695	
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000318	+85092D +85093D	108	0 .2015	109	00979	
000319	+85101D	108	0 .3739	109	0 2263	
000320	+85102D	108	00216	109	0 .0342	
000321	+85103D	108	02015	109	0 .0979	
000322	+85111D	108	0 .0000	109	0 .0000	
000323	+851120	108	00249	109	0 • 0395	
000324	+851130	108	0 .0000	109	0 •0000	
000325	+86001D	108	0 .0000	109	0 .0000	
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000327	+86011D	108 108	00012	109	0 •••0121	
000329	+86012D	108	0 .0028	109	0 0048	
000330	+860130	108	0 .0030	109	0 0094	
000331	+860210	108	0 .0012	109	0 •0121 •	
000332	+860550	108	0 .0028	100	0 0048	
000333	+86023D	108	00030	109	0 •0094	
000334	+86031D	108	00021	109	0 0209	
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000337	+36041D	108	0 .0051	109	0 .0209	
000338	+860420	108	0 .0016	109	00028	
000339	+86043D	108	00051	109	0 •0162	
000340	+860510	108	00024	109	0 0242	
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000346	+86071D	108	00021	109	0 0209	
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